



# **amateur radio**

Vol. 34, No. 10  
OCTOBER  
1966

**25c**

Registered at G.P.O. Melbourne for  
transmission by post as a periodical

## NEW VALVES

1A3	50c	5U4GB	\$1.45	6CW4	\$3.00	7L7	75c	866	\$2.50
1A5	50c	5V4G	\$1.75	6F7	50c	7N7	75c	851	50c
1A7GT	\$2.50	5Y3	\$1.38	6G6	75c	7W7	50c	955	50c
1C7	50c	5Y4	75c	6G8	\$2.60	12A6	50c	956	50c
1D4	50c	5Z3	75c	6H6 Metal	50c	12AV6	50c	958A	50c
1D5	75c	5A3	\$1.75	6J5GT	\$1.00	12AT7	70c	1616	\$1.50
1F5	\$1.00	5A5	75c	6J6	\$1.00	12AU7	\$1.50	1623	80c
1H5	75c	5AB7	\$1.00	6K6	\$1.00	12AU7A	\$1.50	1630	75c
1K5	50c	6AC7	75c	6K7	50c	12V6	75c	1639	50c
1K7	50c	6AG5	50c	6K8GT	\$1.25	12BE6	75c	1636	50c
1L4	50c	6AG7	\$1.25	6K8 Metal	\$2.00	12C8	50c	3793	\$2.80
1L5	\$1.00	6AJ5	75c	6L7	50c	12L5	50c	4021	\$1.00
1L6S	50c	6AK5	\$1.50	6N7	50c	12SA7GT	\$1.00	5004	50c
1M4	50c	6AL5	\$1.40	6R7	75c	12SC7	50c	EA30	40c
1N3	50c	6AM5	\$1.50	6S5	75c	12SG7	75c	EC235	\$2.00
1P5	50c	6AM6	\$1.00	6SA7	75c	12SH7	30c	EC433	\$2.00
1Q3	50c	6AN7A	\$1.65	6SC7	75c	12SN7	75c	EC135	75c
1S5	50c	6AT7	\$2.10	6SF7	75c	12ST7	50c	ET30	50c
1S8	\$1.75	6ASTGT	\$2.00	6SP7	75c	12SR7	50c	EP60	\$1.85
1S9	\$1.00	6AU5	\$1.45	6SH7	50c	12SA5	\$1.70	EV91	50c
1T4	\$1.00	6AUA	\$2.40	6SJ7	\$1.25	12A8	\$2.10	KT60	\$3.00
1U4	\$1.00	6AV5	\$1.40	6SGTGT	\$2.00	12L8	\$1.00	QOE132	\$4.75
1U5	\$1.40	6B8	75c	6SLTGT	\$1.25	2526	\$1.00	QVE047	\$2.50
2A3	75c	6BA6	\$1.25	6SN7GT	\$1.00	35L6GT	\$1.00	RL18	75c
2A7	75c	6BZ2	\$1.35	6SQGT	\$2.00	10	50c	UL141	\$1.00
2D21	\$1.30	6BL8	\$1.80	6S7	75c	30	50c	VR33	80c
2E10	\$2.50	6BM8	\$1.25	6U7	\$1.55	47	50c	VR53	50c
2C3	50c	6BZ2	\$1.35	6U7	75c	50	50c	VR102	50c
3A4	\$2.30	6BR8	\$1.45	6V8	\$1.70	56	50c	VR135	50c
3A5	\$1.00	6BX6	\$1.45	6V8	\$1.14	80	\$1.70	VR136	\$1.50
3A6	\$1.50	6BY7	\$1.40	6WGT	\$1.75	717A	50c	VR137	50c
3B4	\$1.00	6BZ6	\$1.85	6X3	\$1.00	807	\$2.75	VR150	\$1.25
3V4	\$1.80	6C6	50c	6C4	\$1.45	808	\$1.00	VT78 (6D6)	80c
5AR4	\$2.50	6C6	50c	7A7	40c	808	\$2.00	VT127	50c
5A4S	\$1.45	6CG7	\$1.35	7C8	50c	820B	90c	VT161	50c
5B4GT	\$3.75	6C16	\$2.35	7E8	50c	832A	\$6.00	VT601	50c
5T4	\$1.75	6CM5	\$2.25	7E8	50c	837	\$2.00	VU38A	80c

## ROTARY TRANSFORMER MOTORS

Type 321616, new. Input 18 volts, output 370 volts at 70 mA. Size 6 1/2 in. long, diam. 5 1/2 in. Price \$4.50

## CABLES

2-core, shielded, new, 23c yard.  
12-core, shielded, new, 49c yard.  
3-core, plastic covered, new, 30c yard.  
4-core, plastic covered, new, 35c yard.  
6-core, plastic covered, new, 50c yard.

## TRANSISTOR TRANSFORMERS

Output type, 300 ohms e.t., 15 ohms, \$1 each.  
Driver type, 3000 ohms e.t., 1230 ohms, \$1 each.

## CRYSTALS

27.240 Mc., new, \$3.  
29.785 Mc., new, \$3.  
Frequencies available: 452, 5000, 4725, 5205, 5785, 4840 and 3397 Kc. Three for \$2.

## BALUN TOROID

Type 355C. Impedance ratio 2:1:1, 50 ohms balanced to 25 ohms unbalanced, 3 to 30 Mc. For use at the base of a mobile whip antenna, coupled to fixed or adjustable tx output impedance. Lead terminals. \$3.50.

## TRANSISTOR RECEIVER KITS

Kits of parts for the Audio and B.I.O. Sections of the 50 Mk Transistor Receiver described in August "A.R." are now available. Audio Kit \$15.50, B.I.O. Kit \$15.50. Kits will be available for subsequent sections as they are published.

## TRANSISTORS AND DIODES

AC125	9/6	85c	CC169	10/6	\$1.95
AC126	9/6	85c	CC170/AF115N	10/6	\$1.95
AC127	10/6	\$1.05	CC171/AF115N	10/6	\$1
AC128	10/6	\$1	CC172/AF115N	10/6	\$1
AF114N/OC171	10/6	\$1	2N217	10/6	\$1.60
AF115N/OC170	10/6	\$1	2N217S	10/6	\$1.60
AF116N	9/6	95c	2N270	13/6	\$1.35
AF117N	9/6	95c	2N370	15/6	\$1.00
AF118	9/6	95c	2N372	15/6	\$1.00
BC107	11/6	\$1.10	BY100/OA214	10/6	\$1.60
BC108	11/6	\$1.10	OA79	10/6	\$1.60
BC109	14/6	\$1.40	OA80	2/3	30c
OC26	26/6	\$2.60	OA81	3/3	30c
OC35/AT1130A	35/6	\$3.50	OA90	3/3	32c
OC44N	11/6	\$1.10	OA95	3/3	32c
OC45N	11/6	\$1.10	OA200	7/6	75c
OC70	12/6	\$1.20	OA210, 1N1765, 1N174A	8/6	85c
OC71/2N215	7/6 or 3 for \$1	\$1.00	OA211, 810A2	10/6	\$1.00
OC72	7/6 or 3 for \$1	\$1.00	1N3411	50 p.p.v.	15c
OC74N	9/6	95c			
OC75	13/6	\$1.35			

## CHASSIS PUNCH SET

Hezan K-63, sizes 10, 18, 21, 25 and 30 mm. Complete with taper reamer in wooden storage box 70/- \$1.90

## ROTARY WAFER SWITCH

1 pole 24 position 3 bank. Physical size: 3 x 3 inch. Price 30/- (\$3.00).

## DRIVER AND OUTPUT TRANSFORMERS

Transistor type KLA, Driver Transformer, 3000 to 1330 e.t., Transistor type JKB Output Transformer, 300 e.t. to 15. Physical size: height 1 1/2 in., depth 1 1/2 in., width 1 1/2 in. 10/- (\$1.00) each, at 17/6 (\$1.75) per pair.

## RECORDING TAPES

Well known makes. Brand new in cartons. Guaranteed.

150 ft. on 3 inch reel, Acetate	60c
225 ft. " " " "	75c
300 ft. " " " "	\$1.25
600 ft. " " " "	\$1.65
900 ft. " " " "	\$1.75
1200 ft. " " " "	\$1.85
1500 ft. " " " "	\$1.95
1800 ft. " " " "	\$2.05
2100 ft. " " " "	\$2.15
2400 ft. " " " "	\$2.25
2700 ft. " " " "	\$2.35
3000 ft. " " " "	\$2.45
3300 ft. " " " "	\$2.55
3600 ft. " " " "	\$2.65
3900 ft. " " " "	\$2.75
4200 ft. " " " "	\$2.85
4500 ft. " " " "	\$2.95
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5100 ft. " " " "	\$3.15
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5700 ft. " " " "	\$3.35
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6900 ft. " " " "	\$3.75
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60300 ft. " " " "	\$21.55

# "AMATEUR RADIO"

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

OCTOBER 1966

Vol. 34, No. 10

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10 a.m. to 3 p.m. only.

## Publishers:

VICTORIAN DIVISION W.I.A.,  
Reg. Office: 65a Franklin St., Melbourne, Vic.

## Printers:

"RICHMOND CHRONICLE," Phone 42-8419,  
Shakespeare St., Richmond, E.1, Vic.

★

All matters pertaining to "A.R." other  
than subscriptions, should be addressed to:

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P.O. BOX 36,

EAST MELBOURNE, C.2, VIC.

Acknowledgments will be sent following  
the Committee meeting on the second Mon-  
day of each month. All Sub-Editors should  
forward their articles to reach "A.R."   
before the 5th of each month. Any item  
received after the Committee meeting will  
be held over until the next month. Pub-  
lication of any item is dependent upon space  
availability, but in general about two  
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★

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P.O. Box 36, East Melbourne. Two months'  
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should also be notified. A convenient form  
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Direct subscription rate is \$3.00 a year, post  
paid, in advance. Issued monthly on the  
first of the month. January edition excepted.

## FEDERAL COMMENT

★

## 9th JAMBOREE-ON-THE-AIR

On the week-end of 22nd and 23rd October Amateur Transmitting  
Societies all over the world will be co-operating with the Boy Scouts  
World Bureau for the 9th Jamboree-on-the-Air. Since the inauguration  
of this event the Wireless Institute of Australia supported it, calling on  
all Amateurs interested in the activities of the youth of our nation to  
"open their shack doors."

The entire electronic industry—television, broadcasting, manufactur-  
ing, servicing and communications generally—are well aware of the growing  
need for skilled electronic people if Australia, with its increasing role in  
international affairs, is to keep technically abreast of the northern  
hemisphere.

The expedient way is to engender early interest by young people and  
like all other Amateur activities, the Jamboree-on-the-Air is an appro-  
priate means. On the occasion of this event the Wireless Institute of  
Australia again asks all Amateurs to interest themselves in local Scout  
organisations and make arrangements for Scout groups to visit the shack  
while local, interstate and overseas contacts are in progress. This will not  
only add to the knowledge of Scouts as signallers but will also ignite that  
little flame in many to enquire further into the art of radio communica-  
tions and electronics in general.

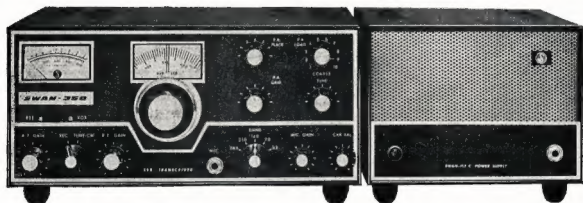
And with the Scouts in your shack you have an admirable opportunity  
to discuss with them the value of the W.I.A. sponsored Youth Radio  
Scheme whereby the boys can start off on the right foot to understand  
radio with a sound basic radio course. If you are unaware of the details  
of Y.R.C. training, then contact the W.I.A. in your State and you will find  
the Institute only too willing to assist you with all the information you  
want. Don't forget the date! October 22 and 23! Your co-operation will  
assist Australian youth and give YOU a lot of pleasure.

G. MAXWELL HULL, VK3ZS, Federal President, W.I.A.

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# STILL AUSTRALIA'S MOST POPULAR S.S.B. EQUIPMENT



Swan SW350 Latest Model Transceiver only	£250 0 0	\$500.00
Swan SW350 Latest Model Transceiver. Fitted with opposite sideband and 100 kc. cal. (Aust.)	£264 0 0	\$528.00
Swan SW350 Latest Model Transceiver. Fitted with opposite sideband and 100 kc. cal. (Aust.), plus de luxe 240v. a.c. power supply with speaker and all cables and plugs in matching cabinet	£300 0 0	\$600.00
Swan SW400 Latest Model De Luxe Transceiver only	£275 0 0	\$550.00
Swan SW406 Transistorised VFO, five-band	£50 0 0	\$100.00
Swan SW420 Transistorised VFO, 20-band full coverage	£84 0 0	\$168.00
Swan SW410 Transistorised VFO, five-band full coverage	£80 0 0	\$160.00
Swan VX1 five-Transistor VOX Unit	£25 0 0	\$50.00
Swan SW22 VFO Adaptor Unit (split channel)	£20 0 0	\$40.00
Swan SW260C de luxe 240v. a.c. Power Supply w. speaker, in matching cabinet	£40 0 0	\$80.00
240v. a.c. Basic Power Supply, without cabinet	£35 0 0	\$70.00
Swan SS2 Opposite Sideband Kit (genuine)	£17 0 0	\$34.00
Swan 100 Kc. Xtal Calibrator (genuine)	£17 0 0	\$34.00
Swan WF5500 12v. d.c. 500 watt Power Supply	£65 18 0	\$131.80
Opposite Sideband Kit (Aust.)	£3 15 0	\$7.50
100 Kc. Xtal Calibrator Kit (Aust.)	£11 16 0	\$23.60
P.T.T. Ceramic Microphone with plug	£5 18 0	\$11.80

## OTHER ACCESSORIES AVAILABLE

Mobile whips, co-axial switches, plugs, sockets, spare parts, valves, plus full range of genuine SWAN spare parts. Easy terms available in N.S.W. and Victoria.

SWAN FACTORY DISTRIBUTOR:

W.F.S. ELECTRONICS SUPPLY CO.

ATLANTIC RADIO

227 Victoria Road, Rydalmere, N.S.W. 638-1715

36 Oxford St., Woollahra, N.S.W. 31-7811

# PORTABLE 240V. A.C. POWER SUPPLY

B. A. WHITE,\* VK5YB

THE problem of producing the much desired 240v. a.c. for the portable station can be overcome with the aid of a small 4-cycle petrol engine and a 1 h.p. single phase capacitor start induction motor.

The equipment detailed above could be quite expensive if bought via the normal channels, however there are many disposals sources releasing 1 h.p. motors for as low as \$2 and the job of reconditioning an old washing machine petrol engine is not beyond the average ability or pocket. It was thus that I economically secured my power plant components.

Be sure that the electric motor has good bearings, and that the "run" winding is OK. The "start" winding and capacitor have no effect in this reverse operation, likewise the starter switch mechanism on the rotor. Check to ensure that the motor is designed to run at 1,445 r.p.m. (or thereabouts) when on the 40-50 c.p.s. supply as this also determines the speed at which the engine must drive the motor to develop 50 c.p.s. as a generator. Higher speed types do turn up and will do the same job provided they are driven at the correct speed.

The petrol engine needs to be in good condition to maintain a constant speed to ensure even cyclage of the generator. I disconnected the "blow-type" governor and fitted a hand throttle to overcome governor surge and consequent variation of cyclage.

Having constructed a suitable base plate from scrap timber, a belt drive was fitted using a car fan belt and two random pulleys approx. 2½" diam. each. The engine seemed to develop suitable power and stability at 1,500 r.p.m., but this may need experimentation with various engines—adjusting the pulley ratios to finally rotate the "generator" at approximately 1,500 r.p.m.

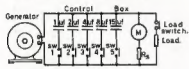


FIG. 1. GENERATOR CONTROL CIRCUIT.

The "generator" has to receive some initial excitation whilst rotating and this may be done by the use of a capacitor block and switches to vary the capacity across the output. A cheap moving iron 0-300 volt meter was set in the output stage to monitor the excitation process. Disposals oil-filled capacitors were used in the set up, but don't forget to parallel each one with a 250K bleeder or else they could give you quite a shock when left switched off.

To excite the generator, the 15 µF. SW5 is closed and starting with SW1 the rest are closed until the meter shows a sudden kick. This occurs only if the particular "generator" has suf-

ficient residual magnetism to produce a low level a.c. voltage to charge the capacitor bank. No load must be applied during this excitation process or it will effectively dampen the small charges produced by the residual properties of the "generator". Once excitation is achieved the voltage will possibly be too high. Reduce the excitation capacity by switching out the lower capacities until about 250-260 volts is obtained. Switch in the load and more capacity if the load drops the voltage too much. Some generators have to receive a d.c. flash to excite them.



The cyclage may be checked with the aid of the synchronous record player connected to the home-brew a.c. source, a stroboscopic disc, used to check the gramophone, and a globe connected to the mains supply. Increase or decrease the engine speed until reasonable synchronisation is obtained. Alternatively, the pocket rev. counter is all that was available on the farm and served satisfactorily.

There are two disadvantages with this system:

- (a) Voltage variation with a change of load.
- (b) Slight beat due to slip or natural magnetic resonances against the exciting capacity.

The first (a) can be overcome by the use of dummy loads or the use of a common power supply for the transmitter and receiver used in portable work, and thus refrain from change of load.

There is little to be done with (b) as it depends on the design of the motor particularly in relation to the material of which it is made. This effect is noticed by slight fluctuation in a low

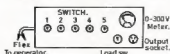


FIG. 2. CONTROL BOX LAYOUT.

powered filament lamp and possibly slight tonation of a b.f.o. against a resolved s.s.b. signal.

This power supply has delivered up to 250 watts and has been used for t.v. on the farm, powering a 100w. soldering iron, lighting and always to operate the receiver in the rig here, as well as the radiogram.

The direction of rotation of the "generator" is immaterial and a fuse system is unnecessary as overload cancels excitation and the whole circuit neutralises despite the continued rotation.

Higher h.p. motors are equally as effective, but appear to require larger capacity for excitation—they, too, would be capable of more output with a larger petrol engine.

The two-stroke motor was rejected due to continued variation of revs., noise and difficulties of handling, especially starting. The only suppression required for Amateur use was the plug suppressor on the 4-cycle engine. The generator is purely inductive and no variable connections are used to necessitate brush suppression.

The credit of this mode of power should be handed to Rollo VK6BO, who has been using this system on his portable gear and caravan for some time. I merely copied his idea and experimented to further the application.

## W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

### PHONE

VK1AEO	306/331	VK4HR	247/263
VK1AMS	306/330	VK1JZ	246/261
VK1B	296/312	VK1Y	237/241
VK6MK	263/319	VK1ADE	235/237
VK6RU	262/315	VK2APK	217/220
VK4FJ	274/290	VK1AK	218/218

New Member:  
VK3MR 100/105

### C.W.

VK1KB	315/350	VK1EO	278/283
VK1ADE	291/313	VK3AQH	267/279
VK1CX	290/311	VK1KNG	266/266
VK1GL	288/306	VK1AFK	261/268
VK4FJ	264/306	VK6RU	250/271
VK1AGH	276/288	VK1XB	243/256

New Member:  
VK3MR 100/105

### Amateurs:

VK1TL	229/246	VK1AX	146/154
VK3PT	222/225		

### OPEN

VK1ADE	305/320	VK1VFN	275/290
VK1AGH	303/321	VK1ARX	270/278
VK6RU	298/321	VK4HR	274/282
VK6MK	295/312	VK3CN	267/267
VK4FJ	291/313	VK3TL	255/260
VK2ACX	278/303	VK2APK	255/263

\* P.O. Box 228, Keith, South Aus.



# SERIES PHASED ARRAY FOR 14 Mc.

WAL SALMON,\* VK2SA

WITH the gradual return to more favourable propagation conditions more Amateurs are utilising the frequencies of 14 Mc. and above. Whilst many possess excellent transmitting and receiving equipment, simple wire dipoles have been, in the main, the only effective antennae for most Hams living in suburban areas.

However, on reading the mail on most of the frequencies, discussions on antennae seem to be increasing in proportion to the rate of increase in sunspot activity. The problem of the acquisition of an efficient antenna can be solved by the installation of high towers and the construction of Quads or Yagis, or dipping deep into your pocket and letting someone else do the job for you.

It would appear that this antenna has not been successfully adopted for Amateur work, due to feed and phasing difficulties and reference to various articles on the subject has amplified this thought.

The basic theory of an antenna of this type originates in the fact that parallel elements spaced one-quarter wavelength apart and fed with equal currents 90 degrees out of phase will have a directional pattern. The maximum radiation is in the direction from the element in which the current leads to the element in which the current lags. In the opposite direction the fields from the elements cancel.

Thought was then given to the construction of an experimental Series Phased Array, and in assessing the problem of suitably feeding the ele-

ments. The greater the separation, the higher the impedance. With this theory in mind it was thought that a centre-loaded tapped coil resonated element would be suitable.

Three half wave elements were then constructed, the loading coil (see photo) consisting of 12 turns of 14 gauge enamel wound on plastic conduit  $\frac{1}{4}$  in. in diameter. The total length of each half wave element when resonated at 14.1 Mc. was 20 ft. 6 inches. It will be immediately apparent that this is a very convenient

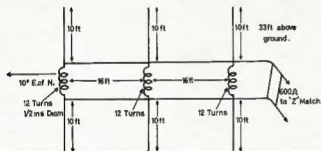


Fig. 1.—14 Mc. Array. (Coil diam. should read  $1\frac{1}{2}$  inches.)

The writer has given considerable thought to the problem and has acquired the habit of collecting data over the years on antennae and antenna heights, and a clear picture has emerged. It would seem that the best DX signals have their origin in an antenna height of a least 60 to 70 feet and one is amazed at the information obtained from some of our American friends. Yagi antennae at 70 or 80 feet are commonplace. One Amateur was using a 6 element Yagi at 100 feet, another a four-element Quad at 70 feet. All this adds up to the fact that if you have a fat purse, you can put out a fat signal.

With the idea of trying to get something for nothing, the writer embarked on a trial and error scheme of testing various types of vertical wire antennae, some with directors or reflectors, over the past 12 months. Some showed great promise on W and European DX signals but could never come close to matching the Yagi and Quad.

Quite recently the writer came across an article by Colin A. Mackenzie, VK3ACM, entitled the "Series Phased Array" (reference "Amateur Radio," February, 1959). As the article states, the antenna was known as the Marconi-Franklin Series Phased Aerial and is specifically designed for end-fire propagation.

ments, consideration was given to incorporating the Delta match system. It is well known that the impedance presented between any two points symmetrically placed with respect to the centre of a half wave antenna will depend on the distance between

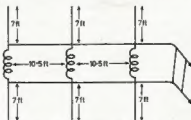


Fig. 2.—Suggestion for 21 Mc.

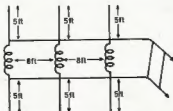


Fig. 3.—Suggestion for 28 Mc.



length to handle either as a vertical or horizontal radiator. The first experimental antenna was fed with 600 ohm open wire line from the transmitter through a "Z" match unit, the feeders being tapped directly across the centre loading coil of the first element. The interconnecting phasing stubs between the elements consisted of 75 ohm tapped across three turns of the element loading coils. In order to save space and time I will merely add that the s.w.r. went haywire and the antenna was a flop.

The co-ax. phasing stubs were then removed and 600 ohm open wire stubs tapped directly across the coils were

\* 77 Flora St., Kilmawoe, N.S.W.

substituted, and we were in business with the antenna firing about 10 degrees east of North, this being the most suitable direction due to the layout of masts at this location. The s.w.r. was 1.3 to 1 at 14,250 Mc.

Seven-stranded copper earth wire is used in the construction of the elements which are spaced 16 feet apart, the total length of the array being 32 feet. The antenna hangs in a semi-vertical plane from a horizontal wire broken with insulators about 33 feet high. You have no doubt been wondering about results. In the brief period the antenna has been in operation reports have been received from Canada, United States and Alaska ranging from S5 to S9 plus 40 db, and in its evaluation I can only comment that I am quite satisfied that the antenna will match in strength many antennae of a more complicated nature. I might mention that the antenna was constructed and erected in about four hours.

One unknown question raised in VK3ACM's article centres around the detuning effects when the antenna is pieced together and raised. Tests were carried out at VK2SA with two of the centre-loaded dipoles, both being separately resonated at 14 Mc. When spaced from 2 inches to 2 feet the dipoles resonated at approximately 15 Mc. When spaced at eight feet to resonant frequency was 14.15 Mc.

I can see many angles for development, such as variation in element length, associated with centre-loading coil size and an increase in the number of elements to provide more gain in the favoured direction and the adoption of the antenna to higher frequencies. In this connection reference might be made to Figs. 2 and 3 for

21 Mc. and 28 Mc. antennae. The only unknown data is the centre-loading coil size which can be easily ascertained by the use of the station g.d.o. before the elements are connected to the feed line.

However, the proof of the pudding is in the eating and I conclude this article by referring to the original story with particular emphasis on the concluding words "so who is willing to carry on from here."

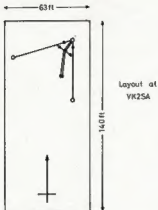


Fig. 4.

#### LATER VERSION

Recently I have put something up in the air which is really fantastic. Figs. 4 and 5 give full details of the array, the forward dipole being bent at an angle of about 80 deg. and the reflector dipole is almost straight. Fifty-nine plus reports from the U.S. and Alaska are pouring in.

#### SERIES PHASED CORNER ANTENNA

AT VK2SA

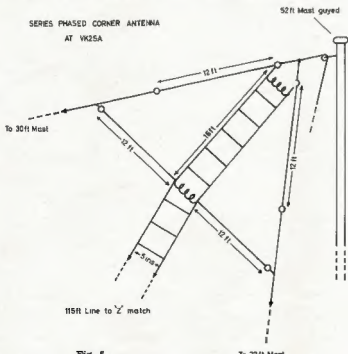


Fig. 5.

To 30 ft Mast

The dipole coils were wound on  $\frac{1}{2}$  in. plastic conduit and consist of 17 turns each, the turns being pushed in or out so that the dipole will resonate at 14 Mc. before connection to the feeders. The coils were then doped and wound with plastic tape.

The antenna is fed with 115 feet of open wire line spaced 5 inches, the spreaders being used, "Biro" pencils. The s.w.r. is 1.4 to 1 and the coupling device to the final is the English "Z" match coupler.

At present I am working on another "corner" antenna for Europe.

★

#### Technical Correspondence—

### Transistor Amplifier Design

Editor "A.R." Dear Sir,

I would like to draw your attention to an article by Mr. R. L. Harrison in the September issue of "A.R." There are several points that are wrong in the article, as well as several that I feel could be very misleading to the people who are likely to use the article. As I feel that mine will not be the only letter to condemn the correctness of the article, I will not give a large amount of detail, but merely point out parts that are wrong. They are:—

1. The choice for  $V_{cc}$  (one should consult the manufacturer's data for maximum ratings).
2. The choice of  $I_c$  (some silicon transistors have their highest  $I_{cm}$  just below 2 mA.); silicon transistors can usually be operated with a very low  $I_c$ .
3. The equation  $R_o = V_{ce} + I_o$  does not follow from the simple fact that  $V_{ce} = V_{cc} + 3$ , (it only follows if  $V_{ce} = V_{cc} + 3$  also).

4. The equation—

$$C_s = \frac{(\beta_o + 1) \times 10^6}{2 \pi f_i (R_{in} + \frac{R_s R_o}{R_s + R_o})}$$

is wrong. Its departure from the true equation is more, I feel, than could be attributed to a printer's error.

5. The assumption that the  $R_{in}$  of the following stage = 500 ohms for germanium, or 1000 ohms for silicon, transistors, is again quite wrong, especially from what Mr. Harrison has said about the choice of  $I_c$ .

6. The statement that the input impedance of an OC71 will be close to 300 ohms is, as for point 5, quite wrong.

7. Mr. Harrison's philosophy for designing the lower cut-off frequency  $f_c$  is 1 feel very misleading and deserves clarification.

Finally, I do agree with Mr. Harrison on one point, he does appear to be confused about transistor amplifier design.

I hope these points may be of some use in assisting Mr. Harrison to re-think his subject. If clarifications on any of the points I have made is needed, please contact me.

—W. Metzenthen, VK3ZOF.

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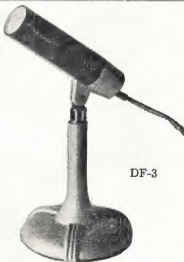
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# TRANSISTOR AMPLIFIER DESIGN

## PART TWO

R. L. HARRISON,\* VK3ZRY

**L**OW level r.f. and i.f. amplifiers are very familiar items to most of us. Valve circuits have been pretty well standardised—and, to a point, so have transistors. This article was written to introduce design techniques that can be used by Amateurs. It is not necessarily an engineering approach. No complicated maths. is involved but that which is included is no more complicated than Ohm's Law. An alternative graph is provided but can only be used under limited circumstances as explained later.

The design is set out in a step by step method again as this is most easily understood and followed. Coil design can be difficult and involve calculus, so a rule of thumb procedure has been outlined to enable transistor matching and coupling to the circuits. To obtain characteristics such as selectivity (narrow or broad) and coupled circuits with a desired amount of coupling is left to the constructor. These are basic characteristics of tuned circuits and to achieve a desired result the constructor should obtain a good text book or else buy manufactured coils to give desired results. Very successful home-brew results can be obtained from miniature ferrite pot-core assemblies and these are suggested in the text. It is advisable to follow manufacturers data supplied with the assemblies for best results.

The first circuit to be discussed is a common emitter amplifier. One circuit for germanium and one for silicon transistors is given in Fig. 1.

Now there are two applications of these circuits requiring separate considerations. The circuits can be used for an i.f. amplifier or an r.f. amplifier and will be treated in that order.

### I.F. AMPLIFIERS

From the circuits in Fig. 1 it is obvious that germanium transistors may require unilateralisation (neutralisation) to cancel the high internal feedback in the transistor itself. The external feedback in Fig. 1a is provided by  $R_1$  and  $C_1$ . The silicon transistor in Fig. 1b does not require these components as internal feedback is inherently low.

Here is the design method suitable for either silicon or germanium transistors.

1. Select a suitable transistor. The  $\alpha$ -cutoff frequency ( $f_{\alpha}$ ,  $f_{max}$  or whatever they call it) should be five to ten times the operating frequency at the least.
2. Determine the d.c. operating conditions and find the values of  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$ , using the method outlined in Part 1 of this article for a low level audio amplifier.
3. Determine  $C_1$ ,  $C_2$  and  $C_3$  from the graph or the following equation:—

$$C \text{ (}\mu\text{F)} = \frac{106}{2 \times f \times R_x}$$

where  $C$  = by-pass capacitor in  $\mu\text{F}$ .  
 $f$  = frequency of operation.  
 $R_x$  = resistor to be by-passed, in ohms.  
 $\pi = 3.1416$ .

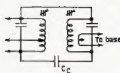
In the case of the base bias network, for finding the value of  $C_1$ , the resistance to be by-passed is the parallel combination of  $R_1$  and  $R_2$ , or  $R_b$ , where

$$R_b = \frac{R_1 \times R_2}{R_1 + R_2}$$

Two curves are given, one for 455 kc. and one for 1600 kc., as these are two commonly used frequencies. If a frequency higher than 1600 kc. is selected then values of by-pass capacitor can be determined as for 1600 kc.; they will be more effective by-passes!

4. Designing the transformers  $T_1$  and  $T_2$ . This task is best left to the engineer for optimum design and ready made coils are available, use these if applicable. If you wish to roll your own, here are a few hints:—

- (a) Use a ferrite pot core assembly, e.g. Ducon type Q2 or Neosid assembly type A2 or B1. Use manufacturer's data guides for best results.
- (b) For germanium transistors, the collector tap should be near the centre of the coil. For silicon transistors the collector tap should be about two-thirds down from hot end of coil.
- (c) For germanium transistors the base coupling link should be about one-sixth of the total turns on the tuned winding. For silicon transistors, base coupling link should be one-twentieth to one-thirtieth of total tuned winding turns.



Two single assemblies  
e.g. Ducon Q2 or Neosid A2

FIG. 2 (a)



Double assembly  
e.g. Neosid B1 side  
by side assembly

FIG. 2 (b)

(d) To obtain narrow or wide band-pass characteristics, double tuned transformers (Fig. 2) should be used, but a sweep generator and c.r.o., or a signal generator plus much patience, is needed to align for best results.

To roll your own double tuned assemblies, couple two single tuned assemblies as in Fig. 2a, or use a double assembly as in Fig. 2b, and rely on mutual coupling internally. Refer to manufacturer's data for best results again.

Two i.f. amplifiers giving a typical, practical example of circuits are given in Figs. 3 and 4. Note that in Fig. 3 there are no collector dropping resistors; these are unnecessary as  $V_{cc}$  is only 4v. and  $V_{be}$  is about 3v.

You will probably notice that by-pass capacitors are lower than that predicted by the formula given previously or by the graph. This is because a different assumption was made (see the end of this article for assumptions made and derivation of the equation) to calculate the by-pass capacitors.

If you wish to use a mechanical filter in your i.f., the primary should be made parallel resonant and the secondary or output side made series resonant (see Fig. 5).

That concludes my screed on i.f. amplifiers. I haven't covered transistors and crystal filters but no doubt they are compatible; nor have I covered other useful i.f.s such as 30 Mc. i.f.s. strips. These require separate considerations which would take up one article themselves—later perhaps.

The next thing is r.f. amplifiers. I will discuss the common emitter design as in Fig. 1 first, then the common base arrangement.

### R.F. AMPLIFIERS

Fig. 1 gives the basic circuits for germanium and silicon transistors. The germanium transistor circuit, though, may not need components  $R_2$  and  $C_3$  as transistor gain and internal feed-

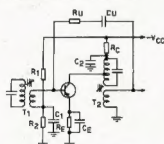


FIG. 1(a)

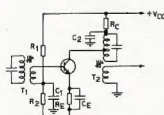


FIG. 1(b)

\* 1 Mary Street, North Balwyn, R.3, Vic.



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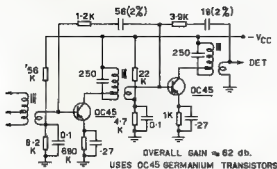
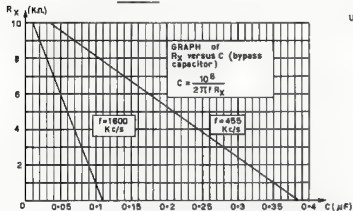


FIG. 3



back change at higher frequencies. Fig. 8 gives the general circuit for both silicon and germanium transistors. The amplifier is shown gang-tuned, but if used on a single frequency (or narrow segment) omit the tuning gang.

The design is the same as for i.f. amplifiers with the exception of the coils.

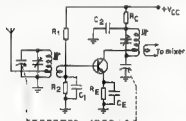


FIG. 4

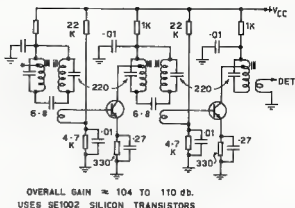


FIG. 5

The collector may be connected to the hot end of the coil as it has a fairly high impedance in this configuration.

#### ABOUT THE GRAPH

The curves were calculated from the formula for resistance-to-be-by-passed limits up to 10K ohms as this is what is generally encountered in practice. The formula was derived as follows:—

Assume  $X_c = R_x + 1000$  (for effective by-passing).

$$\text{Now } X_c = \frac{1}{2\pi f C}$$

$$\text{or } C = \frac{1}{2\pi f X_c}$$

$$\text{Then } C = \frac{1}{2\pi f \frac{R_x}{1000}}$$

$$= \frac{1000}{2\pi f R_x}$$

Now  $C$  is in Farads if  $f$  is in cycles. For  $C$  to come out in  $\mu F$ . and  $f$  to be in kc:—

$$C = \frac{10^3 \times 10^3}{2\pi f R_x}$$

$$\therefore C = \frac{10^6}{2\pi f R_x}$$

where  $C$  = by-pass capacitor in  $\mu F$ .

$f$  = frequency in kc.

$R_x$  = resistance in ohms.

$\pi = 3.142$ .

(Continued on Page 13)

#### Coil Design

More conventional techniques are usable here—high L/C ratio, high Q and good quality components, as in valve circuits. The base coupling link should be a few turns closely coupled to the tuned winding, even a tap on the tuned winding can be used, but a link coil is much easier to experiment with to find optimum turns.

The collector tap is best found by experiment but a good rule of thumb is about half way down from hot end for germanium transistors and one-third to one-fourth down from hot end for silicon transistors (depending on out-

put impedance and gain). A link coupled into the collector tuned winding is usable if you want to experiment to squeeze everything out of the circuit.

For the 3 to 30 Mc. range of frequencies, the by-pass capacitors can be found from the graph for 1600 kc. For frequencies higher than 30 Mc. use your experience (if any). Generally 500 pF. and 1000 pF. will suffice up to 200 Mc.—keep leads short.

Now another circuit hops up—the common base circuit. Fig. 7 gives the most commonly (and most practical) used form. As you can see the signal is still fed into the emitter-base junction, but now output is taken across the collector-base instead of collector-emitter as in the common emitter amplifier.

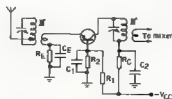


FIG. 7

The design of this amplifier follows the same lines as for the common emitter r.f. amplifier.  $R_1$ ,  $R_2$ ,  $R_c$ ,  $R_e$ ,  $C_e$ ,  $C_1$  and  $C_2$  are determined as outlined above. This circuit finds best use in the upper h.f. into the v.h.f.-u.h.f. region.

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D.c. Current: 0.05, 1, 5, 50, 500 mA., 10 Amp.  
Resistance: 0.5K, 5K, 50K, 500K, 5 Meg, 50 Meg.  
The OL-64 incorporates inductance and capacity scales for useful measurement of C from 200 pF to 0.05 uF, and inductance (L) from 0 to 5000 henries, using an external source of a.c. at 50 volts and 10 volts respectively. Dial read-out from C and L scales on meter. Full instructions included with each meter.  
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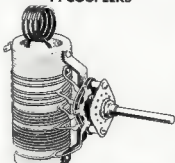
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D.c. Current: 10 uA., 250 uA., 2.5 mA., 25 mA., 250 mA. (10,000 mV.).  
Ohms: 0-2K, 0-25K, 0-250K, 0-250K.  
Scale Centre, Ohms: 100, 1.5K, 15K, 150K.  
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Type 352A/BC—Details as 350A except frequency range 500 Kc. to 5 Mc., or to 30 Mc. for receiving purposes only with increased attenuation. Price \$2.77 (inc. S.T.).

Type 353B—This is a type 350 with a co-axial connector 80-220 (Amphenol) screw type. Price \$4.25 (inc. S.T.).

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Type 355C—Impedance ratio 1:1. 50 ohms unbalanced to 25 ohms unbalanced. 3 to 30 Mc. For use at the base of a mobile whip antenna, coupled to fixed or adjustable transmitter output impedance. Lug terminals. Price \$3.49 (inc. S.T.).

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# A Transistorised Amateur Band Receiver

PART THREE

HAROLD L. HEPBURN,\* VK3AFQ

**B**EFORE describing the local oscillator section of the Moorabbin Club project receiver, the results obtained during the testing of the finished b.f.o. units will be discussed.

This testing was done in two stages. Firstly, the two coils were checked for "out of circuit" resonance before being soldered on to the printed circuit board and, secondly, the completed units were tested for oscillation, wave form and frequency range. Both checks were done at various project meetings arranged for the purpose.

The test set up for measuring the "out of circuit" performance of the coils is given in Fig. 5.

Output from a 75 ohm signal generator was applied across the coil under test. The resonating capacitance for the oscillator coil was 1,100 pF. (2 x 2,200 pF. in series) and 300 pF. for the amplifier coil. A v.t.v.m. fitted with an r.f. probe, was connected across the test coil and used as a resonance indicator. A few coils were checked with core full in and core full out to determine the range of adjustment available but the majority of coils were checked with the core full in.

Results obtained are detailed in Tables 1 and 2.

Resonating Capacity pF	Out of Circuit Resonance Kc.	Number of Coils in Group
1100  ±2½%	< 414	3
	415 - 419	1
	420 - 424	3
	425 - 429	10
	430 - 434	7
	435 - 439	3
	440 - 444	1
	> 445	3
Number of coils tested = 31		
Average = 430 Kc.		

Table 1.—The Oscillator Coil, L1.

The spread of results on both coils was higher than expected, especially in the case of the amplifier coils. Investigation showed that—in all cases but one—coils exhibiting a high "out of circuit" resonance were improperly assembled. Either the ferrite ring was

loose in the can or was prevented from bedding down on to the base of the former by the winding wires. These faults were corrected in the obvious fashion. In the one unexplained case, the coil reacted properly after re-winding and may have had too few turns in the first place.

Of the three oscillator coils exhibiting a very low "out of circuit" reson-

ance, one was rewound with the correct number of turns and reacted correctly. The two remaining "low" coils were not rewound and after incorporation in the circuit would only just tune to 455 kc. with the b.f.o. trimmer capacitor at minimum capacity. It is assumed that these coils had been wound with too many turns.

The equipment used to check the finished units is shown in Fig. 6.

Output from the unit was taken from the amplifier base and fed into a mechanical filter having a 455 kc. centre frequency and a 6 kc. bandpass at the -6 db. points. Output from the filter was fed into a c.r.o.

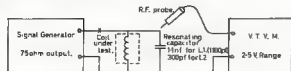
Adjustment was remarkably simple and consisted merely of setting the b.f.o. trimmer capacitor at half mesh and then adjusting the slug of the oscillator coil until a pattern was obtained on the c.r.o. The b.f.o. trimmer was then swung through its range and in most cases it was possible to tune the b.f.o. through the pass band of the filter.

Resonating Capacity pF	Out of Circuit Resonance Kc.	Number of Coils in Group
300  ±2½%	< 489	1
	490 - 494	4
	495 - 499	3
	500 - 504	7
	505 - 509	5
	510 - 514	3
	515 - 519	3
	520 - 524	4
	> 525	3
Number of coils tested = 30.		
Average = 507 Kc.		

Table 2.—The Amplifier Coil, L2.



Neil VK3ZRT and Harold VK3AFQ testing stage 1 audio boards at Moorabbin Radio Club's project meeting.



Note: If a high impedance signal generator is used, a series resistance of 3 kΩ should be inserted at the point marked 'X'.

Fig. 5 COIL TESTING EQUIPMENT.

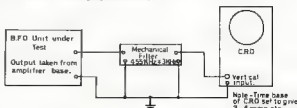


Fig. 6 B.F.O. UNIT TESTING EQUIPMENT.

Note: Time base of C.R.O. set to give 3 complete cycles on tube.





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Two exceptions (noted above) would only just reach the lower side of the filter pass band and one would only just reach the high side of the filter.

Since the test is reasonably stringent the results imply that out of thirty-one units twenty-eight were correct and that the three exceptions were not more than 5-8 kc. off. Unless it was intended to use a mechanical filter centred on 455 kc. in the finished receiver, this minor variation would easily be taken up by centering the i.f. strip on the appropriate frequency.

Another twenty units were not tested at the project meeting, but all information to hand indicates that they are operating satisfactorily.

#### STAGE 4—LOCAL OSCILLATOR

The circuit diagram for the fourth stage of the receiver is given in Fig. 7. The emitter of the AF115N oscillator is tapped down the tank circuit by means of a capacitive divider formed by the 470 pF. and 1,000 pF. 5% silver mica condensers. These two in series provide 340 pF. of fixed tank capacity.

The tuning condenser is a Polar 15-392 single gang item. It was chosen for its excellent mechanical stability and ceramic insulation.

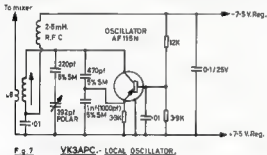


Fig. 7 VK3APC—LOCAL OSCILLATOR.

The 220 pF. 5% silver mica series padder condenser restricts the effective tuning swing to about 140 pF. and under these circumstances the oscillator tunes 3.9 Mc. to 4.5 Mc. Since the oscillator is on the high side of the signal, the resultant tuning range is 3.45 to 4.05 Mc. This range covers the 80 metre band and is ideal for future use with h.f. converters.

Removal of the padder opens out the signal tuning range to approximately 2.7 to 4 Mc. and makes the receiver suitable for tuning any chosen 1.5 Mc. of say the 6 or 2 metre bands.

Use of the companion 15-500 pF. variable in the Polar coverage would provide a greater coverage (which would approximate to 2.5 to 4 Mc.) giving a 1.5 Mc. section of the v.h.f. bands. This latter suggestion has not been tried.

The coil L8 consists of a 10 turn tuned winding of 29 B. S. enamelled wire on a Ducon miniature Q2 pot core. The output link is a single turn of the same size wire.

The 0.01 and 0.1  $\mu$ F. condensers are Ducon 25v d.c.w. "Redcaps" and the three resistors are normal tolerance items.

The complete unit—like its predecessors—is built on a printed circuit board made specially for the project.

The dial and drive used on the receiver is a Jackson Brothers' 6/36. It has a dual speed drive, semi-circular scale and plastic cursor. In the forward direction the drive ratio is 6:1 and for the first reverse turn of the tuning knob is 36:1.

This dial seemed to be the ideal compromise between size, price and mechanical excellence. It is free from backlash and is readily calibrated for whatever frequency range is of interest.

In Melbourne it is obtainable from Ham Radio Supplies in Hawthorn.

Next month it is hoped to describe the final section of the receiver—the r.f. and mixer stages—and to give information on the (50 odd) i.f. strips now under construction.

#### ERRATA

It is regretted that three condensers were omitted from the diagram of the i.f. stage published last month.

A 100  $\mu$ F. 15 volt electrolytic, paralleled with an 0.01  $\mu$ F. 25 volt redcap. should have been shown across the 7.5 volt regulated rails, while a second 0.01  $\mu$ F. 25 volt should be connected between the collector of the OC44 detector and ground (+7.5v.).

#### Transistor Amplifier Design

(Continued from Page 9)

#### USING THE GRAPH

Look up the value of the resistor to be by-passed ( $R_x$ ) on the vertical scale, project a horizontal line across to the curve of the appropriate frequency. Where the horizontal line crosses the curve, draw a vertical line down to the horizontal axis (C) and read off the value of the capacitor and use the nearest value obtainable in your circuit.

Example: The emitter resistor of an i.f. amplifier at 455 kc. is 1K ohms.

A horizontal line drawn from 1K ohms on the R. scale intersects the 455 kc. graph at a certain point. A vertical line drawn from this point down to the C-axis gives 0.35  $\mu$ F.

Well that is about the lot for i.f. and r.f. amplifiers. I have not covered all possibilities, but for most, the information presented above will help you to design and construct something to suit your needs.

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- "A.S." Sept. 1963 and May 1964.
- "73 Magazine," Nov., July, August 1963, January 1966.
- "Electronic Fundamentals and Applications," by John D. Ryder.

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East Melbourne, C.2, Victoria.

## "FIFTY AND OVER"

"Well, well, well. If it isn't my old friend Bill. Or should I say sister Mary's old friend Bill. Ha, ha, ha. Well, well, Bill. Haven't seen you since last night. Ha, ha, ha. You can come in because Mary's out. She knew you were coming. Ha, ha, ha. No, I don't mean it. She'll be back soon and until she comes I'll entertain you in the shack. I've just switched the transmitter on. We'll have some fun getting contacts. But no XL's for you, old man. You're hooked already. Ha, ha, ha."

"Let's tune around a bit and see what we get. There's Bert ZFC. Listen. He's just finished a contact. I'll call him. VK3ZFC, VK3ZFC, VK3ZFC, VK3ZFC, VK3ZFC. . . I'll give him a few more calls. Maybe the poor old man's deaf. VK3ZFC, VK3ZFC, VK3ZFC, VK3ZFC. This is VK3ZOM listening for you, old man. What's new in the chookhouse? VK3ZOM listening. Over."

VK3ZFC, VK3ZFC. Well, well, well. Glad to know you're still in the land of the living, Bert. Ha, ha, ha. O.K. about the new gear you're building. By the way I've got Bill here with me. He comes round every night to see me. Ha, ha, ha. Though he doesn't seem to be very interested in radio. He's got other fish to fry. Ha, ha, ha. Yes, we're going to build some gear here, too. We've got patents out for a electronic mouse-trap, a mother-in-law detector and lots of other things I can't tell you about over the air. Ha, ha, ha."

We're going to be pretty busy here when we get busy. Ha, ha, ha. Say hullo to Bert, Bill. You'll have to learn to speak up for yourself. If you don't do it now you won't get a chance later on, that's for sure. Ha, ha, ha."

That's right. Well I'll put it back to you, Bert, in case your receiver's packed up and I've been wasting my words on the desert air. Ha, ha, ha. VK3ZFC this is VK3ZOM pulling the big switch on the transmitter and pushing the little button on the receiver and listening for you. Over."

VK3ZFC, VK3ZFC. This is VK3ZOM pushing the big switch on the transmitter and returning. Bill missed your words of wisdom, old man. He suddenly remembered he wanted to get toffee for Mary so he's shot off down the street. Maybe the sight of the gear frightened him. Ha, ha, ha. Sorry you've got to go out. I was looking forward to a real long rag-chew. Don't seem to get them often nowadays. Everyone's so busy. I'm busy, too, but not that busy. Ha, ha. Never mind. I'll get you again soon. Cheers and beers and don't do anything I wouldn't. Ha, ha, ha. This is VK3ZOM off and clear with VK3ZFC and having a snoop round the band."

VK3AJE, VK3AJE, VK3AJE, VK3AJE, VK3AJE, VK3AJE, VK3AJE. This is VK3ZOM calling you. What say, Harry. Over."

VK3AJE, VK3AJE. Well, well. If it isn't old Harry. Ha, ha. Haven't heard you on the air for hours. And what's new in the State of Denmark? We've been very busy here doing lots of nothing. Ha, ha, ha. Anyway, back to you

she comes. VK3AJE this is VK3ZOM listening for you with both ears. Over."

VK3AJE, VK3AJE. In case you don't know it this is VK3ZOM returning. Well, well, well. Isn't that a coincidence. Must be a fight or a football match on this evening or something. Was just having a short and sweet contact with Bert. He had to go out, too. You'll have to get a mobile and then we can have a road chew. I mean a road rag chew. Ha, ha, ha. Well, cheers and beers and see you soon. This is VK3ZOM off and clear with VK3AJE and 'aving hanother 'unt—I mean having another hunt round the band. . .

Hullo sister Mary sweetheart. Yes, boy friend number one came in and shot out again to waste some money on you. Can't imagine why. Okay. I'll tell mum you've gone out with him. I'll be having a rag-chew if I can find anyone. Must be someone who hasn't got to rush out to a fire or something. Ha, ha."

Hullo CQ. Hullo CQ. . . Hullo CQ. . .

Hullo CQ. Hullo CQ. This is VK3ZOM with a sore throat looking for contacts. Isn't there anyone on the band? Or isn't the old transmitter working? . . . Hullo CQ. Hullo CQ. Hullo CQ. . .

This is VK3ZOM closing down in disgust after talking to himself for the last half hour. Still even if the audience was small it was intelligent. Ha, ha, ha. Still I must say the band's not what it used to be. Never mind, we'll try again tomorrow. This is VK3ZOM pulling all the big switches and going to bye-bye."

—Roy Markopf, 34 Toolangi Road, Alphington, N.30, Vic.

## SIDEBAND TOPICS

Which manufacturer supplies each transceiver with an individual record of the v.f.o. temperature compensation-drift curve? **GALAXY** does that and no other! And with that graph there is a record of the drift compensation, never more than 500 cycles drift from cold to warmed-up and of the v.f.o. stability after 30 minutes warm-up period.

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★ **5.7 Mc. and 9.0 Mc. Crystal Filters**, Air Trimmers, Reduction Drives, hard-to-get Transceiver Tubes, Co-axial Cable Baluns, etc. Sorry, no 572B Tubes yet, the manufacturer and Waters Co. have let me down!

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- **Genuine SWAN SW240**, with neat home-made a.c. supply, \$275.

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## NEW CALL SIGNS

JUNE 1966

VK1AN R. C. Elliott, 37 Ingalls St., Gar-  
town.  
VK1ZBC-B. J. Christensen, 1 Bosch Place,  
Chaffey.  
VK1ZB-J. C. Jennings, 41 Caruthers St.,  
Curtin.  
VK2HC-J. M. Campbell, 10 Ingham St.,  
Dunrobin.  
VK2UQ-M. L. Steward, 68 Westbrook Ave.,  
Wahroonga.  
VK3BDC-J. R. Thyrd, 28 Hood Ave., Earlwood.  
VK3BIA-H. E. Brown, 81 Mital St., Car-  
rington.  
VK3BLC-G. C. Chenhall, 30 North St., West  
Dulbo.  
VK3BUT-G. K. Trevitt, 28 Schofield Ave.,  
Epping.  
VK3ZPG-G. T. Pile, 32 Clement St., Forbes.  
VK3ZFY-K. L. Robinson, 8 Church St.,  
Pyrmont.  
VK3ZHF-A. J. Smith, 16 Loftus St., Katoomba.  
VK3ZHF-J. F. Henrell, 864 Great Western  
Hwy., Pendle Hill.  
VK3ZNO-D. J. Watershouse, 28 Rosebery Rd.,  
Kilgus.  
VK3ZPF-P. B. Fischer, 8 Aubrey Rd., North-  
bridge.  
VK3ZTF-T. Deana, 29 Memorial Ave., St.  
Ives.  
VK3ZTR-R. G. Turner, 32 Railway St., Went-  
worthville.  
VK3ZXC-N. Deitch, 6 Water St., Camperdown.  
VK3ZVF-North Shore Radio Club, 11 Ruby  
St., Mosman.  
VK3AQ-R. J. Callander, 383 Warrigal Rd.,  
Belconnen.  
VK3SL-M. L. Brans, 24 Ernest St., Broad-  
meadows.  
VK3AAZ-P. H. Cole, 50 Aymer St., North  
Sydney.  
VK3AEY-D. G. Semmens, Teachers' Resi-  
dence, Warrigal, via Cole.  
VK3AH-V. Yates, 35 Henry St., Elghist.  
VK3AJV-R. E. Durrant, 1 Grosvenor St.,  
North Blackburn.  
VK3AMQ-G. C. Page, 72 Ursa St., North  
Sydney.  
VK3ATD-A. C. G. Macindoe, 101 Grange Rd.,  
Toorak.  
VK3AUF-J. Waldmann-Petersen, 58 Flin-  
ty Lane, Greensborough.  
VK3ZIF-L. F. Holmes, 64 South St., Glenroy.  
VK3ZRI-L. R. Price, 14 Wilks Ave., Malvern.  
VK3ZRU-N. W. Ahrens, Diggers Rest.  
VK3ZTS-P. J. Tyers, Tyers Rd., Bena.  
VK3ZVC-M. T. Cole, 3 David St., East Bent-  
leigh.  
VK3ZWC-W. M. Kestley, Flat 3, 3 Edward  
Ave., Dandenong.  
VK4CO-G. Cole, Station: Nurses' Quarters,  
Chifley Hospital; Postal: C/o P.O.  
Chifley.

VK4DU-J. K. McCarthy, Station: Maritime  
Mobile aboard M.V. "Pandemonium",  
Postal: 13 James St., Currumbin Beach.  
VK4QT-A. Anderson, 1 Quarry St., Ipswich.  
VK4UB-W. Dolgelsch, 25 Crawford St., Red-  
cliffe.  
VK4UD-R. C. Wright, 139 Elliot Heads Rd.,  
Rusden.  
VK4ZC-R. J. Cummings, 56 Marsh St., Cam-  
mon Hill.  
VK5QZ-J. A. Hackworth, 34 Oaklands Rd.,  
Somerton Park.  
VK5ZGO-G. K. Oates, 17 Angus Rd., Haw-  
thorn.  
VK5ZPM-F. A. Mathews, 16 Gurr St., Good-  
wood Park.  
VK5ZFE-L. M. Gierzycki, 88 Alexander Rd.,  
Riverside.  
VK5ZFF-D. V. Robinson, 5 Jarvis St., Bun-  
bury.  
VK5ZFR-P. C. L. Robertson, 9 Rudall St.,  
West Leederville.  
VK5ZRH-S. Schroder, C/o Peko Mine, Tem-  
nant Creek.  
VK5SR-Sopas Radio Club, S.D.A. Mission  
Hospital, Sopas, T.N.G.

## AUST. RESULTS OF WORLD- WIDE DX CONTEST, 1965

		C.W.		
*VK1DA	7	8,424	108	8 18
*VK2PV	A	140,430	221	59 95
*VK2VN	A	73,080	207	42 78
*VK2AE	A	42,550	146	40 65
*VK2APK	14	74,706	317	32 54
*VK2GW	7	34,800	242	20 30
*VK3AXK	A	131,979	436	41 70
*VK3RJ	21	20,300	147	20 30
*VK3ABA	21	10,500	102	14 21
*VK3ADB	14	295,596	788	36 91
*VK3ABR	14	6,300	50	18 24
*VK3APN	7	12,240	102	17 23
*VK3XB	3.5	1,054	39	6 5
*VK4EL	21	80,178	396	21 45
*VK4UC	14	3,811	45	15 22
*VK4SS	7	9,964	89	16 18
*VK5BS	A	2,112	33	13 9
*VK5KO	21	51,264	248	23 49
*VK5WC	14	8,106	83	18 24
*VK6RU	A	244,032	549	57 107
*VK7SM	A	72,974	252	42 65
VK9DR	14	120	7	4 4

☆

## SURVEY OF OCCUPANCY OF H.F. BANDS

The part of the work carried out at the Postmaster-General's receiving station at High Park, Victoria, for the I.F.R.B. is a survey of the occupancy of the h.f. bands. During these surveys, it is necessary to identify, rate (in SINPO code), and record all transmissions heard in the band.

To simplify the work for the operators, a frequency measuring receiver has been designed and built having a range of 500 Kc. to 30 Mc. The frequency that the receiver is tuned to is shown on an eight digit in-line display. Accuracy is determined by the standard 1.0 Mc. crystal used in the counter, and in the present equipment will be 1 in 107.

The problems that had to be solved during the development of the counter mechanism which is attached to a standard communications receiver were many.

—Proceedings I.R.E.E. Australia, August, 1966.

		PHONE		
*VK2APK	14	133,770	458	28 77
*VK2VN	14	12,682	101	20 42
*VK2WD	14	12,291	90	18 33
*VK3ATN	A	517,860	717	92 100
VK3LW	14	4,284	41	15 21
VK3XB	14	3,465	39	13 20
VK3KS	14	704	16	7 9
*VK4LT	A	141,750	380	49 86
*VK4CK	A	5,048	51	17 15
*VK4EL	21	6,477	128	9
*VK4ED	14	118,892	339	34 92
VK5LC	14	3,116	28	16 22
*VK5DR	A	16,170	104	19 36

\* Certificate Winners.

† Continental Leaders—Single Band.

N.B.—Rules for the 1968 Contest are the same as for last year. Refer October 1965 "Amateur Radio."

## TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R." in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

## ERRATA

Several embarrassing errors crept into the reprinted article last month, "The 80 and 40 Metre Transistor Special." In Fig. 1 the "transmit" side of switch S1B is shown connected to the two bases of Q3 and Q4, whereas it should be connected to the two collectors instead. The r.f. choke at the input of L1 should be 10 microhenries instead of 10 millihenries as shown. Collector current for the oscillator is 7.5 mA; for the buffer, 100 mA; and for the p.a., 800 mA, all with a 25v. supply, on 80 meters.



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The Revolutionary DX-Magnet V.F.A. (world patents pending) has been acclaimed already by G2FXY and G3HTU who report performance up to usual high "JOYSTICK" standard.

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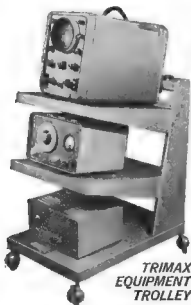
★ 1.8 Mc. to 14.999 Mc. $\pm$ 0.005%.	In Style "D" Holders, $\frac{1}{2}$ " pin spacing	<b>\$4.85</b>
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PUBLICATION	PROJECT	A & R TRANSFORMER TYPE
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ELEC. AUST. MAY 1966 E.E.C. AUST. MAY 1966 ELEC. AUST. MAY 1966 ELEC. AUST. APRIL 1966 OUTLOOK JULY-AUG. 1965 OUTLOOK JAN FEB. 1966 ELEC. AUST. APRIL 1966 ELEC. AUST. APRIL 1966	A Battery Charger for your Car. 1066 R-C Bridge THREE Band Short Wave Converter Twin 5 Watt Class A Transistor Stereo Amp. Protected DC Supply 3 Band Double Change Receiver	PT5786 PT2150 PT3890 Z3200 (2 req'd) Z3212 PT3755 PT2150 PT2062 PT5890 OT E7/15 PT3721 PT TD19 (2 req'd)
E.E.C. AUST. MARCH 1966	Playmaster 113 Stereo Power Amp.	PT2150 (for AG Supply) PT2150 (for AG Supply) PT5890 PT5890 PT1993 OT E7/15 PT1993 PT5890 PT5890
ELEC. AUST. FEB. 1966 ELEC. AUST. FEB. 1966 ELEC. AUST. FEB. 1966 ELEC. AUST. JUNE 1965 ELEC. AUST. DEC. 1965	A Four Channel Audio Mixer Playmaster 112 Transistor Control Unit The 1966 Vacuum Tube Voltmeter A Two Band Short Wave Converter A Simple Public Address Amp.	
ELEC. AUST. OCT-NOV 1965 ELEC. AUST. SEPT. 1964 ELEC. AUST. AUG. 1964	Playmaster Program Source A Powered Monitor for Radio Systems A Practical Photographic Timer	

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Page 18



# Y.R.S.

Some important re-organisation is taking place in VK3. Circumstances are not the same in every Division so it does not follow that the VK3 re-organisation is a new pattern others must follow. State Supervisor Howard Rides and a keen committee are tackling their particular problems in a well thought-out way. They have prepared Articles of Association for the Youth Radio Clubs of Australia (Victoria Division), an organisation which is to be basically self-controlled and self-financed by fees (about one or two dollars) collected from the participating clubs or non-club participants. The exceptions to this independence are that the name of the State Supervisor (elected by the Y.R. Clubs) is to be submitted for approval to the W.I.A. (VK3), the auditors are to be from W.I.A. (VK3), and in the event of failure, funds are to revert to W.I.A.

It must be understood that this is in no sense a break-away movement and full co-operation in both directions is to continue. The whole question needs more discussion when the details and implications have been thought over. A separate organisation would absolve the W.I.A. from any legal responsibility (but pass it on to the shoulders of the new organisation) and allow enthusiasts free development of ideas without reference to a busy W.I.A. Council. On the other hand, the aforesaid busy Council, under the new arrangement, must forget Y.R.C. business altogether—it should be remembered that, although the main business of a W.I.A. Division Council should be its work for senior members and the W.I.A. generally, these Council members are spare-time workers already well burdened, the Youth Radio Clubs

can be given the support of the Division in many ways without involving the time or money of the W.I.A. Council.

While attending a Conference (on other matters) in Melbourne, I met a teacher from Aquinas College in Perth who gave me some details of Bro. McKenna's organisation at the College. What a pity Perth is so far away—it sounded so impressive that I would like to visit.

I am personally keen on the Duke of Edinburgh Award Scheme and I am glad to hear that soon there will be definite views of how Y.R.S. achievements fit into the pattern of Gold, Silver and Bronze Awards. Do Club Leaders have these in mind for development?

VK3 jottings are plentiful as usual. Y.R.S. certificate holders are to be allowed to purchase from the Divisional Disposal Store. Pierce 2APQ suggests that advanced clubs might participate in the Australia Project and should telephone him if interested. A new certificate for Radio Monitors is suggested (i.e. listening in a systematic way through specified s.w. segments). A total of 395 Elementaries have been awarded so far in VK3 alone. Alan Watson, secretary of Christmas Island Amateur Radio Club, has sent 43 towards Y.R.S. expenses—even its adult members are sent for Y.R.S. certificates. Bruce North, of Kiama High, has full A.O.C.P. and joins the small group of scholastic A.O.C.P.s. The experiment at MITTAGONG Training School for Boys (trying the effect of an absorbing interest in Electronics) is still proceeding but could benefit from some help in the way of parts, duplicated sheets and any instructional material. Mr. Jack Standish (Epping Boys' Club) has the loan of a good 150w. a.m. tx and should now be on the air (All interested in Y.R.S. should gather on 80 mc Wednesdays at 1800 E.S.T.) Camp Technology will be on again at Charmers—enquiries should be made early to Mr. T. Mayne, 18 St. Aidan Ave., Dundas. Donations are gratefully acknowledged from Milton E.L. Commonwealth Electronics, A.W.A., General Accessories, S.T.C., O.T.C. and Mr. Hope. New clubs are formed at Homebush Boys' High and Singleton High (Thanks to Mr. Horsfield who was a 1965 member of the Sydney Teach-

ers' College Radio Club). Jan BEJO will help at Singleton and they should be a transmitting club before long. Max 2BHK reports that Secma Eigt. should be active soon—he is building a tx for it. T3, Ken 1KM.

## Publications Committee Reports

At the September meeting the Committee considered correspondence from the Secretaries of VK3, VK4, VK5 and VK7, and a verbal report from VK3, all dealing with the annual mass deletions on those unfinancial. It was decided that for this year the re-instatements will take effect from the October issue instead of January, as was suggested. Later in the year consideration will be given to the suggestion from VK4 that the Divisions be charged the costs involved in making the re-instatements.

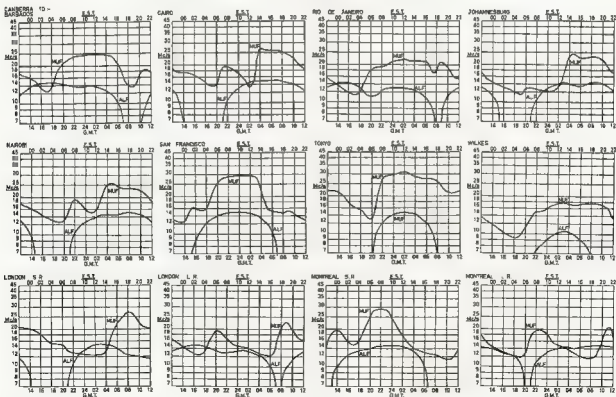
Correspondence on other matters was received from VKs 3ZTM, 3ZOF, 3ASC, 4AT, 4QL and Greg. Johnston. Mrs. Shawsmith wrote to advise that Al 455 is on the sick list and would be unable to do the DX Notes this month.

Technical articles were received from VKs 1AU, 3PY, 2ZAL, 3UG, 3CV, 3ABP, 3AH7, 3ASC, 3ZDX, ERG and Greg Johnston. Sideband Notes have been omitted this month as they arrived too late for us to prepare drawings.

During the last month a number of letters were received from individuals advising changes of address for the magazine. These have been sent to Divisional Secretaries, to whom they should have been originally addressed. The only changes of address to be notified to "A.R." are those for direct subscribers and the Call Book. Call Book alterations must also be notified to the P.M.G. Department.

The Call Book is progressing to schedule and at this time no delays are foreseen.

## PREDICTION CHARTS FOR OCTOBER 1966



(Prediction Charts by courtesy of Ionospheric Prediction Service)





DF-2

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Output Impedance 50 ohms or 50K ohms  
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(SEND CORRESPONDENCE DIRECT TO DIVISIONAL REPORTER NAMED AT PARA. END)

As mentioned in these columns a month or so ago, it was reported that two Amateurs were going overseas, and would endeavour to find out a little about what is happening in other countries as far as Amateur Radio is concerned. Allan Elliott, VK3AL, is still away at the time of writing and we are looking forward to hearing of his observations and views. I hope that the other VKCIBJ has returned from vacation in U.S.A. West Coast and some of his comments may be of interest.

His comments on the attitude of the American Amateur to the future of Amateur Radio is particularly interesting, and to quote him: "No Ham that I spoke to was concerned about I.T.U. or the future of Amateur Radio. They are convinced that the government is well aware of the part they play nationally, and internationally, that they seem confident that the radio will be retained as a hobby, and listening in locally, can appreciate what they mean. There are literally thousands of them on the air at any one time. Their nets are something to hear. The slides and the microphone are not missing. Frame patching is part of life and with calls for military personnel, etc., they, in fact, render an effective part in the communications set."

This apparent complacency is something to be marvelled at, especially in the light of all the official comments that one hears, and while this state of affairs may be very good, and promising for the Amateur population in U.S.A., the same situation and appreciation of the Amateurs worth will not necessarily apply in less fortunate countries with limited Amateur populations. However, the next I.T.U. Conference will tell the tale.

Dave also spoke with Bill Orr, WSAI, at the Arner factory and acquired some information on launching details for our "Australians." Some of the shacks he visited were KJDF, WELOD, WYVNGS, VETBJ, VETAKS and VETBHH. Reading between the lines, Dave apparently had a very pleasant tour and Federal Executive are indebted to him for the time he took to discuss some mutual problems —thanks a lot Dave!

As mentioned before, all work has been completed and all that requires to be done is the drafting of the necessary regulatory changes by the Commonwealth Attorney General. All the submissions have been placed in this Department's hands but, as can be well understood, pressure of parliamentary business during the Budget session has slowed up the final release of all details.

The Czechoslovak Central Radio Club will again stage the International OK DX Contest from 0000z to 2400z on Sunday, 12th Nov. All bands 1.8 through 28 Mc. may be used and the Contest is for c.w. only. Full rules and sample log sheets may be obtained from this Bureau.

From 1st August the address of the W3  
QSL Bureau is Jesse Lieberman, W3KT, RDI,  
Valley Hill Rd., Malvern, Pa. 19355, U.S.A.  
The new address for the DLA/DLS QSL  
Bureau is M.A.R.S. Radio Station, Hq. 82nd  
Signal Bn., A.P.O., New York 08175, U.S.A.  
The XL (or Excellent) Radio Club address  
of its aims and conditions of membership.  
This is based on long term service and  
length of membership of the said or smallest  
Radio. Full details of the membership require-  
ments may be obtained from this Bureau or  
from OHYV. There is no membership fee.

The Radi Club A.P.A.S. is staging a celebration to mark the twentieth anniversary of its foundation. The festivities are scheduled for October and include an official station on the air continuously for 24 hours. This club, which is associated with the R.E.V., caters particularly for the listener section of their

The QRP Radio Club is conducting a publicity drive to increase its membership above the 3,000 mark. This active Club has members in all continents and in over 40 countries. It is an organization of Amateurs who accept the challenge of operating under low power conditions to effect any QRM on very crowded

**Amateur bands.** Hundreds of its members are seasoned and veteran operators who depend on their operating ability and knowledge of radio and band conditions to effect contacts rather than to exercise brute force with high power and cause needless QRM. The club sponsors contests at regular intervals and a series of worth-while, attractive awards for operating ability are available.

Membership is restricted to stations employing a top power of 100 watts or less, and lifetime membership costs only one dollar (U.S.). The club includes the receipt of the club's quarterly newsletter for the first year of membership. Renewal of subscription for subsequent years is by mail or annually. This club, which already has a score of VK/ZL members, should make great appeal to VK Amateurs considering our power limitations. All membership enquiries should be addressed to the writer, or to Fred Behrman, W6LWS, 3425 King Rd., Milwaukie, Oregon, U.S.A.

Traffic through this Bureau for August reached the all-time monthly high of 9,146 cards. Following on \$,000 for each of the three previous months, a record year seems assured.

—Ray Jones, VK3RJ, Manager.

A larger than average attendance—about 80—turned out for the VKJ Division's monthly meeting on Friday, 26th August, in the absence of the President (Tom VKJOD), who had a bad dose of the flu, the chair was occupied by the Senior Vice-President, Bill VKJBY. The featured integrations, "The Future of the Present" and "The Future of the Future" were delivered by Mr. Trevor Andrews, of the Fairchild Transistor Co., was a very topical one for the times in which we are living and the lengthy question time afterwards was an indication of the interest shown by the audience. We would say that the large attendance was a direct result of the general and increasing interest these days in this particular subject.

As the hurrier pointed out, there has been such a remarkable change in the field of electronics that it is difficult to find electronic devices a mere 10 or 15 years ago, that it was impossible to even guess what the future would hold. Only a few years ago quite influential people in the industry thought that transistors would never take the place of valves; also that they would never operate at the high speeds of valves. But with such vast technical advances that transistors were now available for operation in the 100's of millions per second, the speaker said, no person must realize that, to quote one instance, the success of the current space program was revolved around the fact that valves have been replaced by transistors. The building of computers was another field where transistors had come into their own, and he pointed out that the original designing of bulky electronic circuits was to the present stage where they were economical.

The lecturer said that the output of integrated circuits in Australia over the past two years had risen from 50 to 100,000. The amazing increases in the use of semi conductor devices in such a short space of time had been assisted in large measure by improved methods of mass production.

Touching on what is perhaps the most important section of the art so far as we are concerned, Mr. Andrews said that manufacturers of communication equipment had been slow to change from valves to transistors. However, a change was coming over the scene. A further pointer to what we may expect in the future was that, in the U.S.A. at the present time, the complete sound channel

It is with deep regret that we record the passing of:

VK2AKP—Vic Holmes

VE3CA—Clive Hughes

VK3YV—Howard Wohlschlag

colour t.v. receivers may be purchased (in large lots) for \$3.50 each.

In moving the voice of thanks to the lecturer, Rex SYA said Mr. Andrews had illustrated by his very fine lecture what wonderful opportunities awaited the young general electronics engineer in the field of electronics.

While still on the subject of lectures, the Education Officer (Harold RAAH) has lined up Syd ZSG to give the lecture at the October meeting, the subject being "Television Signal Generation." Syd has had many years' practical experience in the field of television. The lecture for November will be given by Ted SINDERS, an A.W.A. engineer, on "Solid State Soundband."

Visitors at the meeting included John ZLJAAU and Jim ZLSLY. The Hunter Branch was represented by Keith ZAKX and Tony ZZCT, while Mr. E. Archibald, Superintending Airways Engineer from D.C.A., was also present.

The following applicants were admitted to membership of the W.I.A.: Full Members—B. H. Christensen (12BC), J. M. T. Davies (3AUD), R. A. Emmerton (1AUO), J. K. Gibling (3ZKG), S. G. Leatherman (3ZGL), R. G. Lukin (8ZDL), R. Mudie (3ZRQ), A. E. Peppercorn (1AEP); Associates—Geoffrey Campbell, D. P. Johnstons, J. E. Ralph, W. Silberstein, F. Tubbs and R. R. Warleigh.

W.I.C.N. News: Peter 2A2XJ informs us that the new 160 Mc. f.m. base station has been obtained and installed at 2WI Dural, since then reports have been received of better coverage. This released 2KJZ to which he had indicated previously at Dural. Stations are now beginning to appear on the net from country areas. There have, of course, always been several stations in Orange, but 2IE (Bathurst) is now a regular, and 2ZFG is also appearing from Forbes and 2JXK is moving from Orange to Wongahilly, near Dubbo. There still is a 2KJZ station in Orange as soon as the call sign has been issued.

Other new stations over the past couple of months include E2DN and 3B3O (Hunter Beach), 2TX and RASA (Central Coast), 2Z2Z (Berry) and 4G2L, 2Z2Z, 12RZ, 12GX, 12AF and 122Z (Newcastle City).

For the information of those interested in W.C.E.N. activities, the following frequencies are those for N.S.W.: Two Metras (i.f.m., plus or minus 15 kc. peak deviation)-Channel A, 53.780 Mc. Channel B, 53.800 Mc. Channel C, 146.100 Mc. Six Metras (i.f.m., plus or minus 15 kc. peak deviation)-Channel A, 53.870 Mc. Channel B, 53.850 Mc. (a.m.); Channel 1, 53.790 Mc. Channel 2, 53.826 Mc. Channel 3,

The QSL Officer (Syd RSG) reported that during the past month there had been 2,850 inward cards and 1738 outwards. He had been given attention to the fact that he had been in the position of QSL Officer for a past year and he considered that that period of time was long enough to be in the one job. He therefore served notice that he would be resigning the position in three months' time. Syd made no secret of the work that he had done in the job of QSL Officer, and that time spent on QSL matters, so far as he was concerned, amounted to about 13 hours a week. He was giving three months' notice so that another QSL Officer could be found, and he was also giving notice of the training of anyone interested in the position.

In our opinion, the running of the QSL department would be one of the more onerous tasks among our Divisional activities. While Syd has been in charge the numbers of cards handled have broken all records, involving much extra work. Therefore, the members generally, and particularly those who specialize in working DX, certainly owe both Syd and Ted ZACD a debt of gratitude for their efforts.

Conjulating on the necessary qualifications of Syd's successor while in a facetious frame of mind, one could almost visualise the following advertisement appearing in the Positional Vacant column: Wanted, lady or gentleman, dedicated to U.S.A. affairs, not afraid of work, able to handle a range of communications, ability to decipher indecipherable call signs, worldwide geographical knowledge (including flyspecks on the map sometimes occupied by DX-peditionals). Remuneration: You kidding?!

The Youth Radio Service was well represented at the meeting by the following: the Supervisor (Rex SYVA), Keith LARKIN (Westlake Radio Club), and Stan ZEL (Cantabury Scout Troop instructor), several ladies

presented themselves for the handing over of various prizes and certificates they had won as winners of their studies. A "competition" conducted during the evening on behalf of the Y.R.S. was won by ZWP.

A group of ladies, headed by Miss JAXS and assisted by Council member, Hebe JAXS, and KYLA of Council members ZJRD and JCS, have commenced a new initiative at Wireless Institute Centre—providing (for a very small charge) afternoon teas on the second and fourth Saturday of each month. These are served between 3 and 4 p.m. to coincide with the opening of the disposal store. The first effort proved very popular and the larger than normal crowd of ladies who very quickly took care of the scones, strawberry jam and cream. Ladies who would like to assist at these times have an easy QSO with the ladies and are asked to phone Hebe on 55-5656. QM's could help to make this venture a success by patronizing it. In addition to assisting the Division financially, we commend this as an excellent opportunity for members and their KYLA to have a social chat over a "cuppa".

Continuing with social matters, Ivan SAHM reported that the theatre party he had been organising for Sept. to see the film "My Fair Lady" has resulted in a complete sell-out of 100 tickets, with 70 people booking for the theatre supper after the show. It is hoped that similar parties will be arranged when the opportunity occurs.

Reference was made at the August general meeting that a copy of the past year's VKX stations in this year's R.D. Contest tallied 140. It will be interesting to see just how many of these 140 have done the right thing by their Division and entered a log. We still support it was thought we would have a good chance of landing the trophy for the first time. However, if some of you have teams who may have done in other years—left it to the other bloke—then we will have two chances of winning our own "Buck's". We understand that the Westlake Radio Club has been recommended for the 1966 Institute of Radio and Electrical Engineers Efficiency Certificate and awarded a medal. This is the most efficient Y.R.S. Club, and we are sure that we echo the sentiments of all when we say "heartiest congratulations".

## VK2 DIVISION

### CRYSTAL LIST

5030, 5035, 5127.5, 5165, 5205,  
5235, 5295, 5295, 5327.5, 5335, 5380,  
5385, 5435, 5487.5, 5485, 5545,  
5582.5, 5587.5, 5645, 5660, 5687.5,  
5730, 5740, 5780, 5782.5, 5815,  
5820, 5860, 5892.5, 5907.5, 5950,  
5955, 5995 kc. In 8T243 holders,  
\$1 each or in groups of five for  
\$4. 6 Mc. range next month.

Goods listed for sale by the VK2 Division are available to W.I.A. members of any Division. Please address inquiries to Radio Equipment Store, 14 Atchison St., Crows Nest, N.S.W.

### LECTURE TAPES

No. 11—V.h.f. History, no slides or diagrams. (Ed. Tilton, WI-HDQ).

No. 12—Quad Antennae, 68 min., 20 slides. (H. Burtoft, VK2AAH and S. Molen, VK2SG.)

No. 13—Linear Amplifiers, 1 hr., 17 slides. (Bob Wilson.)

No. 14—Transistorised R.f. Converters, 1 hr., 12 slides. (Sid Molen, VK2SG.)

No. 15—The Spirit of Discovery, 55 min., no slides. (Edwin H. Armstrong. (Recorded by H. Burtoft.)

Details in August "A.R." page 19. Inquiries to Education Officer, Wireless Institute Centre, Crows Nest, N.S.W.

Tim ZETM and Joe ZEOO landed back in Sydney about the end of August after a month spent touring right around Australia, covering nearly 10,000 miles in the process. At time of writing we had not sighted Joe, but the fact that he is back in Sydney is a relief. We think of two possibilities—he is hiding from someone, or he is preparing for a job at South Australia over the winter.

Gerald Sablin, one of the "pillars" on whose broad shoulders rest our Publications Department, has sent out an SOS for someone to give a few hours of his time to return Monday night a month, from about 8.30 p.m. Gerald would be delighted if you knocked him off his perch with offers of help.

To those who make a practice of reading only the disposal page of your Bulletin and then tossing it aside, may we suggest you dig it out and read it. It is a return Monday as read (in the July and August issues, anyway) all about the very handy publications available merely by dropping a line (accompanied by the necessary offer of help) to the Secretary, W.I.C., 14 Atchison St., Crows Nest, N.S.W.

The publication of this issue of "A.R." will probably coincide with two important Conventions that are set for the Six-Hour week ending in the first week of the month of October. Our friends of the Hunter Branch and the South-West Zone have been busily preparing for some time and we trust that the weekend before next will be a fine weather and large attendances. 75, Ivan SAHM.

### HUNTER BRANCH

Spring is sprung.

The grass is green.

I wonder where

The signals last

Yes, I wonder. Since the R.D. Contest hardly a thing has been heard on 1.8 and 3.5 Mc. Where have all the operators gone? Deserted bands can do no good for the Amateur cause since it is a well known fact that band occupancy influences future allocations. The I.T.U. Conference cannot be far away. To ensure that we still have our hands after this conference, we must do our best to be allowed. Firstly, it is essential to use all the frequencies we have. And this applies equally to the h.f. and the v.h.f. bands. The empty two megs. from 148 to 149 is just waiting for someone to use it. If we don't, someone else will. As for 148 f.m. use it as a calling frequency for all means. It is not as difficult as the exclusion of other two metre operation. Top band, too, deserves more attention and is the best for the 100 metre band because it was not used and very few countries have the 146-148 segment. Let's grab it while there is still time.

Now, secondly, we must have a representative at Geneva when the Conference is called. If your domestic funds are not made to the fund, then make it now—as next month or next year may be too late.

Local Amateurs were shocked to hear of the death of Vic ZAKP last month. Vic had been living in retirement at Balmoral on the lake and was a daily user of the 80 mc band. This son-in-law, who had been made to be in him an interest in v.h.f. and was a listener on this band. Vic became an Amateur 30 years ago when he was a railway employee and Glen Innes and he was a member of the places in the State where he made use of his call. All who knew Vic will mourn his passing.

On the Eastern side of the lake where the grass grows greener than anywhere else, according to those whose domicile is there, a big trouble is the lack of a good band down to which defies all the experts to make it go. Added to this, his close neighbour, Milton is awaiting his call sign. It appears that as soon as Bob's rig is ready he will have to draw up a roster of operating time. Two 150-watt rigs with 50 amp coils cause some mutual interference perhaps. The solution is quite clear—it's the ducktail for Bob. He tells me that he has a raffle ticket in a pair of ducks for Christmas so perhaps he'll do all right after all.

The Sept. meeting, the first one, was not as well attended as previous ones. Those who didn't go really missed an outstanding lecture given by Warren O'Rourke, who is a technician for one of the large cable firms. Warren brought along almost every type of carbon microphone and displayed them all on a large lecture bench in Room 6. The gear shown ranged from an early 25c Reporter to the very latest u.h.f. radiophone. While describing the equipment, Warren outlined the most common types of design and gave those present details of conversion of the popular phones for Amateur use. The lecture table was surrounded by interested operators for over an hour after the lecture and questions came from all angles. This was a fitting

## OBITUARY

V. A. (VIC.) HOLMES, VK1AKP

We regret to record the death of Vic. Holmes, VK1AKP, who passed away to the hereafter on the 14th August. Vic was one of our well known country members, and for many years had resided at Maitland.

It was while living in the Maitland district that he made a name for himself and the Amateur movement in a time of serious emergency. During the early days of the New Guinea V.I.C. out emergency communication work of such a high order that he was given a letter of commendation by the N.A.W. Commissioner of Police.

Vic. is survived by his wife and family (Kew. Watson, VK2KZW, being a son-in-law), and to them we offer the sympathy of all members of the N.S.W. Division.

### GORDON WEYNTON, VK1XU

When Gordon Weynton passed away last month, after an incurable illness for more than 3 1/2 years, the ranks of the Amateur Service lost a man whose bravest exploits were in the ranks of the V.I.C. out activities as a prisoner of war in Chang during World War II, whilst bringing untold pleasure to his fellow prisoners by the risk of his own life, were little known to those outside.

Gordon, as an accountant and business executive in civil life, rallied to the cause of the V.I.C. in the ranks at the beginning of World War II, and rose to the rank of Sergeant with the 8th Division Signals when he was in Malaya, and when the war rose to the rank of Lieutenant and was taken prisoner when Singapore fell in 1942.

His experience in Amateur Radio since the 1930s gave Gordon the urge to provide the prisoners at Sandakan Prison Camp news of events outside. At severe risk to his own life, and the acceptance of several other prisoners and outside sympathisers, an organised underground resistance movement was organised by the V.I.C. and the V.I.C. and the V.I.C. were obtained and put together as a radio receiver. Special chemical recoders were used to receive the signals from the camp's a.c. mains were converted to d.c. and the receiver commenced to provide news to the prisoners from the B.A.C. on 4th November, 1942.

Construction of a transmitter was commenced by which it was hoped to guide a rescue force to the camp. Discovery of the existence of the components put an end to this project and resulted in Gordon and others being subjected to torture and privations. Gordon was taken to the Weynton in three years could not begin to be understood but suffice it to say that the rescue continued to operate and its whereabouts were never divulged.

After being charged and tried, Gordon was sentenced to 10 years in gaol. He became so ill he was sent to Changi Prison and after recovering was sent to gaol where he remained until the end of the war. In October, 1946, he was sent as a witness to the Tokyo War Crimes Trials.

Despite experiences too foul to relate, Gordon settled back to civilian life again, becoming Mayor of Castlemeads (1948-51) President of the Executive of the Castlemeads Woolen Mills and later holding executive positions with the Wangeru Woolen Mills, an Oil Company and a couple of years in partnership with General Motors-Holden in Victoria.

Although a busy man, Gordon found time to take up an active post as Vice-President and Executive of the W.I.A. He conducted these posts with the same zest and zeal as he applied to everything he did. His calm disposition and considered deliberations were an asset to the Executive of the Wireless Institute of Australia of which he was a member for over 20 years and whose interests were always his interests.

It is with great sadness that we record the passing of Gordon Weynton. He suffered so much in order that others could live.

support for the vote of thanks moved by Frank Z2FX.

In an attempt to beat Dave 2AWZ at his own game, your humble scribe made and described a d.f. aerial for 40 mc. This is a quite simple device but the originator of the design says it gives results like all that matters. From reports it looks as if there will be some opposition in future fox hunts on 40 mc.

Just in case you get this copy early enough, please remember that there is a meeting in October. The next meeting will be on Nov. 4 when Gordon Z2SG will give all the latest clues on converting Condensed receivers. Gordon has had a great deal of success with these units and his ideas for getting the most out of them are quite revolutionary in many respects. Don't miss this lecture—it's a beauty.

A visitor to the Branch last month was Andrew 1RD, who is well known to listeners to the movie practice service. He was accompanied by David 2BSC who is at present in Canberra. Also visiting on two occasions during the month were Gordon 2BGR and Steve Z2GX. They provided plenty of activity on both 2 and 180 metres for the few hours they were in Newcastle. Stations lasting on 2 mc. i.m. are increasing and Phil 1TZ and Doug 2ASA have both been heard at good strength in Newcastle. Now that 2WI has a strong enough signal to be heard locally, this is a good mark of reference.

By the time you read this, Phil will be on his way to London via the Bombay-London road. I wonder who will be working the DX? Bill 2XZ is still going strong with DX mobile and now has over 106 countries. He says each succeeding one is ten times as hard to land! For those who are interested there is good news on v.h.f. aerials. If you'd like to know more, ask at the next meeting and hear all about it. And please don't forget that there is a meeting in October—the next one is on Friday, 4th Nov—usual place, Room 6, Clegg Building Newcastle Tech., at 8 p.m. See you there, 3, 2AXE.

CENTRAL COAST BRANCH

On August 19 the members of the Central Coast Branch enjoyed an evening with Dave 2AWZ, who gave a very lively and interesting talk on fox hunting. There were 27 present including some visitors from Newcastle and

Sydney. Dave had his "Fox Box" with him and this contained some most unusual gadgets for removed from boxes, but still an important part of the game. One such item was an alarm clock (almost indispensable) and a cake of bonfire. It is emphasized that it is necessary to understand the psychology of the fox, who gets up to all sorts of dodges to mislead the hunters. An accurate bearing with a compass before starting off is also very important. All in all, it was a very good evening and everyone appreciated Dave's efforts in travelling up from Sydney.

Eric 2EH is off on an ocean voyage around the South Pacific in a few days and no doubt will return with a few choice anecdotes. Phil 2XK and his XVA, have the middle of Sept. for an extended round the world tour. Highlight of their trip will be a bus tour from India to London. They expect to meet their travelling on Mark, on route and have a few days with him. They have many interesting side trips planned and will be the envy of a good many people. Max, No. 1 son, will hold down the fort while they are away.

Don't forget the annual Field Day held at Gosford around the middle of February. A definite date will be announced later. 73, Max 2AXE.

BLUE MOUNTAINS BRANCH

For the August monthly meeting at Lawson your truly showed a half hour movie of various points of interest taken on my way home from the States. For a change it was very hard to get a word in with everybody present. The club h.f. section is active on the ground, but I understand that it could be up for the next meeting. No crack fellows. I know that conditions have not always been right.

Not much on the grape vine this month. Did hear that the Katoomba boys have found a supply of 6 mc. net rocks. Well so much for our private line on 5 Trev. Allen Z2FZ is on the air with a little more power, a 323 and a converter for receiver, and seems to be working more stations. A couple of more calls since have been coming up 5 mc. soon, more info as it comes through. Seems like the old hill is starting to buzz just like the old days. Keep it up fellows.

I hear Jack 2NC is likely to be back on 2, so maybe with the right bait and tide you might catch him. Jack is also window shop-

ping for a.s.b. near, not sure what for, maybe s.s.b. on 432? Ron 2AVN and Graham Z2GV have been active, watch it chaps. Derek 2ND straightened out 2WI on behalf of the Branch the other Sunday. Thanks Derek, and while I am on holidays trying to catch cockle picked up, Trevor 2TM will be helping out with the Branch call back on Sundays. Well fellows the Scout Jamboree on the Air is just around the corner. I know you will assist again as in the past. Until the next meeting at Lawson, 73, Ron 2ADA.

VICTORIA

WESTERN ZONE

Once again there does not appear to be much activity in the Zone, however a few contacts are being made on v.h.f. and 20 mc. The usual stations appear on 3600 kc. at 1000 hrs. G.M.T. each Wednesday evening on the Western Zone net. We had the pleasure of hearing Merv 2APD on the net frequently during the past month. Merv had moved to a new QTH at Wodonga some 12 months ago and very little had been heard of him.

The Contest proved to be an enjoyable weekend with most Zone members participating. At least three members made one hundred plus contacts. John 2AFU, Harry 2EX active on a.s.b. Chase 2IB active on n.w. Bill 2AKW, Bert 2EF and Herb 2NN being heard on 2 m.

2ADA, who is now a student at a Melbourne university, joined the net during the term holidays as a visitor to 32X's QTH. This proved to be the first phone contact Alex had made. We look forward to hearing you again Alex. During the past few weeks your scribbles have had the pleasure of visiting a number of Western Zone stations. Namely Bob 2ARM and Herb 2NN. It was interesting to note how Herb 2NN and son Garry generate an a.s.b. signal on 2 mc. and it certainly works C.B. 73, Harry 2EX.

SOUTH AUSTRALIA

The monthly general meeting of the VKS Division was held in the club rooms on the fourth Tuesday in August to standing room gathering only. In fairness to my section of disaffected readers in VK4 and VK6, I feel that I should point out that the reason for the standing room was really due to the fact that the caretaker, for some reason or other, only put out half the usual number of chairs and therefore it was a case of stand or go home.

Very little business of any importance was transacted, although I must refer to the fact that among the Western visitors was Marg 2LTC acquired by that Gay Lothario, Gilbert 2GX, who happened to be visiting her sister in VK3 and decided to drop into the meeting just to see what makes VK6 tick.

The meeting took the form of a display of members gear and the following members rallied around and gave a short description of their gear and the use of the display. Barry 2ZAU, a 6 mc. transistorized tx, Curl 5CL, a dummy load built into an intriguing container; Ross 2KS, a 2 mc. v.h.f. tx; Dave 2LW, a Trevor 2ZTM, a 2 and 6 mc. v.h.f.; Bob 2RG, a two terminal oscillator; Bob 2EDX, two regulated power supplies, Ross 2DD, a hybrid tx; Heinz 2SC, a protected transistor power supply, Eric 2ZEL, a 2 mc. converter; Trevor 2ZLS, a 148 Mc. i.m. transceiver, and Geoff 2TF, a communications 10 mc.

The awards were for three sections, v.h.f., Instruments, and general. The v.h.f. award went to Barry 2ZAU, the instruments went to Bob 2EDX, and the general award went to entries in the general award, and both of these were Council members, Ron 2KS and Geoff 2TY, and thus not permitted to compete, there was no award. To these members and all who made the display possible, goes the thanks of all present for an enjoyable and interesting evening.

I was a little upset at not being able to describe the entry of Geoff 2TY, mainly be-

BRIGHT STAR CRYSTALS

FOR ACCURACY, STABILITY, ACTIVITY AND OUTPUT

Our Crystals cover all types and frequencies in common use and include overtone, plated and vacuum mounted. Holders include the following DC11, FT243, HC-6U, CRA, B7G, Octal, HC-18U:

THE FOLLOWING FISHING-BOAT FREQUENCIES ARE AVAILABLE IN FT243 HOLDERS:—

- 6280, 4095, 4535, 2760, 2324 Kc.
- 5,500 Kc. T.V. Sweep Generator Crystals, \$7.25;
- 100 Kc. and 1000 Kc. Frequency Standard, \$17; plus Sales Tax.

Immediate delivery on all above types.

AUDIO AND ULTRASONIC CRYSTALS—Prices on application.

455 Kc. Filter Crystals, vacuum mounted, \$13 each plus Sales Tax.

ALSO AMATEUR TYPE CRYSTALS—3.5 AND 7 Mc. BAND.

Commercial—0.02% \$7.25, 0.01% \$7.55, plus Sales Tax.

Amateur—from \$6 each, plus Sales Tax.

Regrinds—Amateur \$3, Commercial \$3.75.

CRYSTALS FOR TAXI AND BUSH FIRE SETS ALSO AVAILABLE.

We would be happy to advise and quote you.

New Zealand Representatives: Messrs. Carrel & Carrell, Box 2102, Auckland. Contractors to Federal and State Government Departments.

BRIGHT STAR RADIO

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With the co-operation of our overseas associates our crystal manufacturing methods are the latest.



# DISPOSAL BARGAINS

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Phone 81-1935

(Mon. to Fri., 10 a.m. to 5 p.m.; Sat., 10 a.m. to 12.30 p.m.)

## SWITCH BOARD

Completely wired, Type F & F. T.M.C. unit. Contains 38 key switches, 26 P.M.G. Plugs, 94 Drop Latches, hand-operated Genemeter for ringing. Size 22 in. wide, 13 in. deep, 21 in. high. Weight 80 lbs. Price \$93.

## CONDENSERS

50 uF. 200v., pigtail 20c ea., 23 dozen  
500 uF. 15v., pigtail 50c ea., 23 dozen  
1 uF. 80v., pigtail 50c ea., 10 dozen  
1 uF. 100v., pigtail 10c ea., 21 dozen  
10 uF. 20v., pigtail 10c ea., 21 dozen

## PP/430/APG-30 POWER SUPPLY

Radar type, new. Contains 38 valves—5 6AQ5, 5 6X4, 4 12AX7, 4 6AL5, 3 6AL5, 2 12AT7, 2 6BD6, 4 6BD6, 2 6BD6, 2 6BD6, 2 6BD6. Also twin 85v. blower motor, relays, variable cond., transformer, etc. 800 cycles. Ideal for working. Sorry, no further information. Brand New. \$35.

## STEEL TRANSFORMER BOXES

6 1/2 x 8 x 5 inch with matching lid, air vents each end. Ideal for battery charger, etc. Unpainted, new. \$1. Discount for quantity.

## DURAL TUBING

1/4 inch Tubing, 5 ft. lengths 36 ft. for \$3 or 40c per 5 ft. length.

## NEW TOGGLE SWITCHES

E.P.S.T. 1/2- each. D.P.D.T. 10/- each.

## POTENTIOMETERS

Wire Wound, 4 Watts, 1 1/4 inch diameter. Sizes available: 3, 10, 25, 50, 100, and 20K ohms, 4/- each.

## NEW CHANNEL LOCK PLIERS

Type 237W --- 20/- each  
Type 355 End Cutters --- 20/- each

## ZENER DIODES

OAZ208 --- 15/- \$1.50 OAZ210/BZ214  
OAZ211 --- 13/- \$1.30 OAZ212/BZ215  
OAZ213 --- 12/- \$1.20 OAZ214/BZ216  
OAZ215 --- 10/- \$1.00 OAZ216/BZ217

## BATTERY CHARGERS

Dual, a/w. Meter in Metal Hammerless Case  
4 volt 4 amp., 12 volt 4 amp. 187/- \$18.75  
8 volt 6 amp., 12 volt 6 amp. 217/- \$21.75

## MAGNETIC RELAYS

Sealed Type  
24 volt, 670 ohms. D.p.d.t., size 3 x 1 1/4 inch, Price 15/- (\$1.50)  
24 volt, 700 ohms. D.p.d.t., size 1 1/4 x 1 inch, Price 15/- (\$1.50)

## DISPOSAL METERS

G.E.C. Panel Meters, 50 mA., 3 1/4 inch round, 2 1/2 in. round mounting hole. Brand new, \$175

## T.V. PROBES

American Precision, TV-52, 480 Mc., 30,000 volt. Brand New carton. \$9. 13 only.

## BRACKET BEZAL LAMPS

1/4 inch diam. Bezel in Red, Amber, Green. Suit screw type globe. 25c, 4 for \$1.50.

## NEW CHOKES

7-5H. 125 mA. 20/- ea. 14 H. 90 mA. 12/5 ea.  
10 H. 4 mA. 12/5 ea.

## NEW VALVE SOCKETS

4/250A Sockets	30/- each
Acorn	3/6
EP50	3/6
VCT50	10/-
805	2/6
EA50	2/6
5-pin	2/6
6-pin	2/6
7-pin	2/6
7-pin P.T.F.E. Sockets	5/-
Lockal P.T.F.E. Sockets	5/-
Special completely shielded 7-pin P.T.F.E. socket and shield	10/- pair

## CONDENSERS

M.F.D. Volts	Price	M.F.D. Volts	Price
2 25	25c	50 150	75c
2 50	25c	50 200	75c
2 100	25c	50 300	75c
2 250	25c	50 450	75c
2 500	25c	50 600	75c
2 1000	25c	50 750	75c
2 2000	25c	50 900	75c
2 3000	25c	50 1050	75c
2 4000	25c	50 1200	75c
2 5000	25c	50 1350	75c
2 6000	25c	50 1500	75c
2 7000	25c	50 1650	75c
2 8000	25c	50 1800	75c
2 9000	25c	50 1950	75c
2 10000	25c	50 2100	75c
2 12000	25c	50 2250	75c
2 15000	25c	50 2400	75c
2 20000	25c	50 2550	75c
2 25000	25c	50 2700	75c
2 30000	25c	50 2850	75c
2 35000	25c	50 3000	75c
2 40000	25c	50 3150	75c
2 45000	25c	50 3300	75c
2 50000	25c	50 3450	75c
2 55000	25c	50 3600	75c
2 60000	25c	50 3750	75c
2 65000	25c	50 3900	75c
2 70000	25c	50 4050	75c
2 75000	25c	50 4200	75c
2 80000	25c	50 4350	75c
2 85000	25c	50 4500	75c
2 90000	25c	50 4650	75c
2 95000	25c	50 4800	75c
2 100000	25c	50 4950	75c
2 110000	25c	50 5100	75c
2 120000	25c	50 5250	75c
2 130000	25c	50 5400	75c
2 140000	25c	50 5550	75c
2 150000	25c	50 5700	75c
2 160000	25c	50 5850	75c
2 170000	25c	50 6000	75c
2 180000	25c	50 6150	75c
2 190000	25c	50 6300	75c
2 200000	25c	50 6450	75c
2 220000	25c	50 6600	75c
2 240000	25c	50 6750	75c
2 260000	25c	50 6900	75c
2 280000	25c	50 7050	75c
2 300000	25c	50 7200	75c
2 320000	25c	50 7350	75c
2 340000	25c	50 7500	75c
2 360000	25c	50 7650	75c
2 380000	25c	50 7800	75c
2 400000	25c	50 7950	75c
2 420000	25c	50 8100	75c
2 440000	25c	50 8250	75c
2 460000	25c	50 8400	75c
2 480000	25c	50 8550	75c
2 500000	25c	50 8700	75c
2 520000	25c	50 8850	75c
2 540000	25c	50 9000	75c
2 560000	25c	50 9150	75c
2 580000	25c	50 9300	75c
2 600000	25c	50 9450	75c
2 620000	25c	50 9600	75c
2 640000	25c	50 9750	75c
2 660000	25c	50 9900	75c
2 680000	25c	50 10050	75c
2 700000	25c	50 10200	75c
2 720000	25c	50 10350	75c
2 740000	25c	50 10500	75c
2 760000	25c	50 10650	75c
2 780000	25c	50 10800	75c
2 800000	25c	50 10950	75c
2 820000	25c	50 11100	75c
2 840000	25c	50 11250	75c
2 860000	25c	50 11400	75c
2 880000	25c	50 11550	75c
2 900000	25c	50 11700	75c
2 920000	25c	50 11850	75c
2 940000	25c	50 12000	75c
2 960000	25c	50 12150	75c
2 980000	25c	50 12300	75c
2 1000000	25c	50 12450	75c

## NEW PLUGS AND SOCKETS

Octal Plug --- 3/8 each  
Octal Socket --- 1/6 each  
5-pin Speaker Plugs --- 2/6 each  
4-pin Speaker Plugs and Sockets --- 1/6 each  
8-pin Jones Plugs and Sockets --- 7/6 each  
Pye Plugs --- 2/6 each  
Pye double bulk Chassis Sockets --- 3/6 each

## MODULATION AND DRIVER TRANSFORMERS

Modulation Transformer, 15 watts, pair of 6AQ5 to 2E28 valve  
Also Driver Transformer, single ended primary to push-pull grids of 6AQ5.  
21 the lot, or Mod. Trans. 30/-, and Driver Trans. 10/-

## SCOPE SPARES

Copper Tips	\$0.11	Return Spring	\$0.15
Standard	\$0.11	Flux Lead	\$1.75
		Rokette Lock	
		Nut	\$0.15
Copper Tips	\$0.11	Brass Nut	\$0.25
Instrument	\$0.11	Handle, complete	\$1.50
Barrel, Standard	\$1.00	Switch Ring	\$0.25
Barrel, Stainless	\$1.00	Rubber Grip	\$0.05
Steel	\$1.00	Grommet Spring	\$0.15
Element, Carbon	\$0.10	Grommet Nut	\$0.15
Bead Retaining	\$0.05	Terminal Box	
Nut	\$0.05	Cover	
Beads, Ceramic	\$0.05	transformer	\$0.40
Push Rod Assembly	\$1.05		

## SPECIAL BARGAINS

DC Crystal Holders, new, less crystal, 75c  
Carpenter Relay and Socket, Type 221, 1000T  
30 ohms, 50T, 200 ohms, 50T  
P.M.G. Strip Boards, containing 24 Jacks, \$3.  
P.M.G. Strip Boards, containing 48 Jacks, \$5.  
Headphone Cord, new, 45c each.  
3-pin Plug with two yards Cord, 45c.  
Bags of Mixed Resistors (50), \$1.50 bag.  
Three for \$1.  
75 ohm Co-ax Cable, 25 ft. lengths, 3/16 inch diameter, \$1.  
75 ohm Co-ax Cable, 27 yard lengths, 3/16 inch diameter, \$2.  
Vibrators, 125 Type, \$3 each.  
122 Aerial Packs, \$5 each.  
12-core Cable with Plug, 22 yards long, \$5.  
Dural Tubing, 12 ft. lengths, 1/4 inch diameter, three for \$1.  
P.M.G. Key Switches, 75c each.

## P.M.G. TYPE

Standard Rack, 19 inch panels and chassis. All sizes. Plenty to choose from. Personal shoppers only

## ROTARY SWITCHES (JABEL)

2-pole, 2-position	15/-	\$1.50
4-pole, 2-position	18/-	\$1.80
2-pole, 6-position	18/-	\$1.80
1-pole, 12-position	18/-	\$1.80

**HAM**

**RADIO SUPPLIERS**  
5A MELVILLE ST., HAWTHORN, VIC. Phone 86-6465  
8 PARK STREET, GLENFERRIE, VIC. Phone 81-1935



recently, who by the sound of his voice, was of W origin. The said VK4 commented, in a somewhat surprised tone of voice, on the amount of 'I Mc. being used by other than Amateurs. After the surprise usually comes the frustration.

Have you been keeping an eye on the VK6 notes these days? Well, I have, and I cannot help but see a possible rival, both with his sense of humor and the length of his notes.

unless they forget to submit a log. It appears to me that once again there were me fabulous scores attained in all States, and not all by sideband stations either! I wonder which State will run out winners on this occasion? As one Eastern State's gentleman put it to me shortly before the thing

re ho ho and a bottle of spa water, it's off  
to go to seek for buried what'sname or

unless they forget to submit a log. It appears to me that once again there were me fabulous scores attained in all States, and not all by sideband stations either! I wonder which State will run out winners on this occasion? As one Eastern State's gentleman put it to me shortly before the thing

Amateur Radio, October, 1966

# A LARGE RANGE OF TRANSMITTERS, RECEIVERS, TEST GEAR, AND DISPOSALS RADIO PARTS AVAILABLE

## ★ TRANSCEIVERS, TR1986-7

115-145 Mc. Employs heterodyne exciter in tx. TT15 p.a. Single xtal locks Tx and Rx on same frequency. In-built modulator. Supplied with 4.86 Mc. xtal. \$30, circuit \$1.

## ★ MARCONI TF1101 R/C OSCILLATOR

20 c.p.s. to 200 kc., 1% distortion, current model. \$240.

## ★ SR550 DUAL CONVERSION COM. RECEIVER

160 metres to 6 metres, Amateur Bands only. 3.5 Mc. xtal band edge marker, xtal supplied, product detector for s.s.b. \$240, 10% discount for cash.

## ★ SCR522 V.H.F. TRANSMITTER/RECEIVER

100-150 Mc. Complete with tubes, \$28.

## ★ PERSPEX SHEET

1/16 inch thick. Size 4½" x 16". \$1 per sheet.

## ★ COMMAND TRANSMITTERS

4-5.3 Mc., 5.3-7 Mc. Complete with tubes, \$15.

## ★ TR3624 TRANSMITTER/RECEIVER

Approximate frequency, 200 Mc. Contains 46 miniature tubes, \$30.

## ★ 3J160E HIGH POWER TRIODES

120 Mc. full ratings. Heater 10v. 29a., anode max. volts 3000v., anode max. current 1000 mA., r.f. output 2150 watts. \$8 each.

## WANTED TO BUY

Communication Receivers, Test Equipment, etc. Call, write or phone. Equipment inspected and picked up at your convenience any night or week-end.

## ★ VALVES

EF50, 20c ea.; 7C7, 10c ea.; CV131, 6CQ6, 50c ea.; 6AC7, 20c ea.; 6AL5, 20c ea.; 6C4, 6AM5, 50c ea.; 6QE03/12, \$2 ea.

## ★ SIGNAL GENERATORS

TE22 Audio Generator, freq. range: sine 20 c.p.s. to 200 kc., square 20 c.p.s. to 25 kc., in four ranges. Output, 7v. p-peak. Output impedance, 1,000 ohms. Price \$42.

## ★ METERS, P25 TYPE

0-500 uA., \$5.25; 0-100 uA., \$6.95; 0-1 mA., \$4.50; 0-10 mA., \$4.50; 0-50 mA., \$4.50. Full range of Meters and Multi-Testers available.

## ★ CO-AXIAL CABLE

UR70 72 ohms, 3/16 inch diam. in 27-yard rolls, \$2 plus 75c pack and post. In as-new condition.

## ★ RAIB COMMUNICATIONS RECEIVER

150 Kc. to 15 Mc. in six bands. B.f.o., etc. Genuine original condition, with a.c. power supply, \$70.

## ★ TRANSISTORS

Brand new. OC72, OC44, 2N132, OC66, OC45, 80c each. AT1138 Power Transistor, 30w., Class B, \$3. Also Diodes: OA71, OA81, OA95, 35c each.

## ★ SE700A TRIPLE CONVERSION COM. RECEIVER

80 metres to 10 metres. 1st and 3rd oscillators xtal controlled, 3.4-4.0 Mc. tunable i.f., selectable sidebands, 85:1 geared dial, v.f.o. output for transceive operation, selectivity: 0.5, 1.2, 2.5, 4 kc. Internal 1 Mc. xtal calibrator (xtal supplied). Undoubtedly the finest receiver ever to come out of Japan. \$500, 10% discount for cash.

## ★ MILLER 455 Kc. PRE-WIRED I.F. STRIPS

Comprises two i.f. stages, ceramic filter, diode detector, 55 db. gain, NPN silicon transistors, d.c. requirements 6v. d.c. 2 mA., size 1½ x ½ x ½ inch, \$8.70 inc. tax.

## ★ TRI6A MULTIMETERS

100,000 ohms per volt. Ranges, d.c. volts: 0.5, 2.5, 10, 50, 250, 500, 1K.; a.c. volts: 2.5, 10, 50, 250, 1K.; d.c. current: 10 uA., 1 mA., 25 mA., 250 mA., 10 amp.; resistance: 20K, 200K ohms, 2 megohms, 20 megohms. To clear, \$25.95.

## ★ POTENTIOMETERS

Wire wound, 40c each; carbon, 25c each.

## ★ RESISTORS

½ watt, I.R.C., Welwyn, Elre, Ducon, Phillips, \$2 per 100.

## ★ ½ H.P. 2-STROKE MOTORS

Ohlsson and Rice. Brand new, just imported from America. Weighs only 5½ lbs. 6,300 r.p.m., supplied with 3:1 reduction gearbox, output 2,100 r.p.m. Ideal for driving Alternators for Field Days. Fuel consumption 1 pint per hour. \$30.

## ANY QUERIES

Beginners are welcome, ask Jim and Laurie Gardiner any questions. They are Amateur Radio operators and will be only too pleased to assist.

## ★ CRYSTALS

Personal shoppers only, \$1 each.

## ★ SPECIALS

3AP1 c.r.o. tubes. New in cartons, \$1.25.  
3000 type Relays, 50c each.  
Inter-Office Phones, 15-station type, \$4 each.  
7-pin skirted Valve Sockets, P.T.F.E. insulation, silver plated, only 20c each, c/w shield.  
Speaker Transformers: 7000 ohms to 2 ohms; 10,000 ohms to 3.5 ohms; 50c each.  
9-pin skirted P.T.F.E. Valve Sockets with shield, 50c each.  
Irish Recording Tape, Mylar Base: 150 ft. x 3 in., 75c; 900 ft. x 5 in., \$2.75; 1150 ft. x 6½ in., \$3.50; 1800 ft. x 7 in., \$4.75.  
3 uF. 1000v. d.c. Block Capacitors. Only 25c each or \$2 per dozen.

## ★ MINIATURE CAPACITORS

New shipment. 600 v.w. Values: 0.001, 0.02, 0.005, 0.0005, 0.0002, 0.0001 uF. \$2 for 80, plus freight.

ALL ITEMS FREIGHT EXTRA

# UNITED TRADE SALES PTY. LTD.

280 LONSDALE ST., MELBOURNE, VIC. (Opp. Myers)

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# Hallicrafters' advanced technology brings you a new breed of amateur equipment



## SX-146 Receiver

This is an Amateur band receiver of advanced design employing a single conversion signal path and pre-mixed oscillator chain to assure high order frequency stability and freedom from adjacent channel cross-modulation products. The SX-146 employs a high frequency quartz crystal filter and has provision for installation of two more crystal filters. The receiver may also be used from 2 to 30 Mc., with the exception of a narrow gap at 9.0 Mc., with the connection of auxiliary oscillators. The highly stable conversion oscillator chain may be used for transceiver operation of matching HT-46 transmitter.

**FREQUENCY BANDS:** 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-28.05, 28.5-29.0, 29.0-29.5, 29.5-30.0 Mc. (28.0 to 28.5, 29.0 to 30.0 requires extra crystals at user's option.)

**SENSITIVITY:** Better than 1  $\mu$ V. for 20 db. S/N.

**TUBES AND FUNCTIONS:** 6JD6 r.f. amplifier; 12AT7 signal mixer and cathode follower; (2) 6AU6A 9 Mc. i.f. amplifier; 12AT7 a.m. detector—a.v.c. rectifier—product detector; 12AT7 u.s.b.—l.s.b. crystal oscillators; 6GW8 audio amplifier and audio output; 6BA6 variable frequency oscillator; 6EA8 crystal heterodyne oscillator and pre-mixer; plus diode power supply rectifier, a.n.l. diode and a.v.c. gates diode; \*6AU6A 100 kc. crystal calibrator oscillator; \*harmonic generator diode.

**I.F. SELECTIVITY:** Uses a 6-pole crystal filter to obtain a nose-to-skirt ratio better than 1 to 1.8.

**PHYSICAL DATA:** Size, 5 $\frac{1}{2}$  x 13 $\frac{1}{2}$  x 11 inches. Shipping weight, 20 lbs.

**FRONT PANEL CONTROLS:** Frequency—Power off, c.w.—upper-lower and a.m.; audio gain; band selector—3.5, 7.0, 14, 21.0, 28.0, 28.5, 29.0, 29.5; selectivity—0.5, 2.1, 3.0 kc.  $\pm$ 5 and 5.0 kc. filters optional extra; pre-selector; i.f. gain; a.v.c. on-off; cal. on-off; a.n.l. on-off; phone set jack; Smifer.

**REAR CHASSIS:** S-meter zero adjust; internal-external oscillator switch; slave oscillator output; external oscillator input; antenna socket; speaker, ground and mute terminals; grounding stud; a.c. power cord.

**POWER REQUIREMENTS:** 105/125 volt—50/60 cycle a.c.—35 watts.  
\* Part of HA-19 calibrator.

Amateur net, \$450.00

Optional crystal filters: 0.5 kc., 5.0 kc., available.

**MODEL HA-19** plug-in 100 kc. quartz calibrator available as accessory.

## HT-46 5-Band Transmitter

All new from the ground up! Here's the "new breed" transmitter that matches your SX-146 . . . works independently or may be interconnected for transceiver operation.

**FEATURES:** 180 watts p.e.p. input on s.s.b.; 150 watts on c.w.; frequency control independent or slaved to SX-146 receiver; upper or lower sideband via 9 Mc. quartz filter; built-in power supply; press-to-talk or optional plug-in v.o.x.; grid block keying for c.w.

**FREQUENCY COVERAGE:** 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5 Mc. and 28-30 Mc. in four 500-kc. steps. Crystal supplied for 28.5-29.0 Mc. coverage. Other plug-in crystals at user's option.

**TUBES:** 6BA6 v.f.o.; 6EA8 heterodyne crystal oscillator and mixer; 12AT7 carrier oscillator-third audio; 12AT7 mic. amplifier; 6EA8 9 Mc. i.f. amplifier and a.s.c.; 6AH6 mixer; 12BY7 driver; 6HF5 power amplifier; OA2 reg.

**FRONT PANEL CONTROLS:** Frequency tuning; operation-off; standby, u.s.b., l.s.b., c.w.—tune, standby l.s.b., u.s.b.; microphone gain; driver tune; carrier level; band selector; final tune; v.f.o. select—transmitter-receiver; dial cal.; calibrate on-off; meter MA-RFO.

**REAR APRON FUNCTIONS:** A.c. cord; ground lug; fuse; key jack; v.o.x. accessory socket; antenna jack; receiver input for transceiver; 11-pin control socket; bias adjust.

**PHYSICAL DATA:** Size, 5 $\frac{1}{2}$  x 13 $\frac{1}{2}$  x 11 inches. Shipping weight, 28 $\frac{1}{2}$  lbs.

HA-16 Vox Adaptor.

Amateur net, \$507.00

W.F.S. ELECTRONICS SUPPLY CO.

ATLANTIC RADIO

227 Victoria Road, Rydalmere, N.S.W. 638-1715

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